



# LAB NEWS

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SANDIA NATIONAL LABORATORIES • ALBUQUERQUE NEW MEXICO • LIVERMORE CALIFORNIA • TONOPAH NEVADA



## *Special Issue*

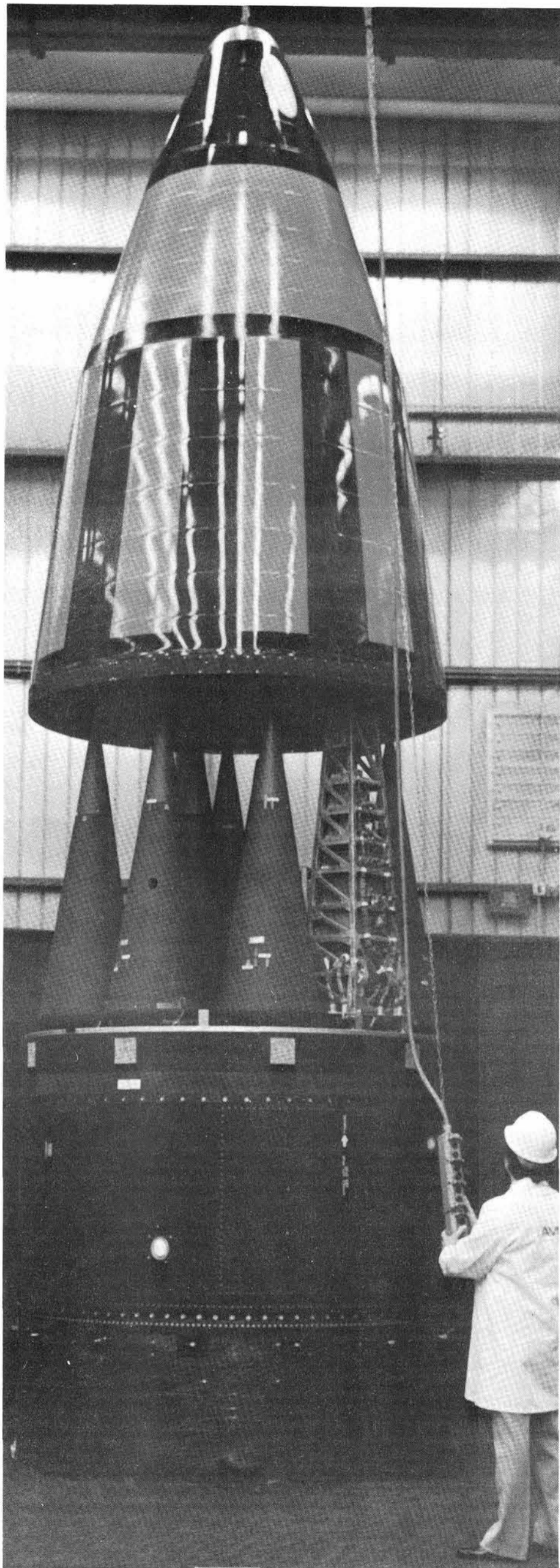
FLIGHT TESTS of the Ground-Launched Cruise Missile (GLCM) are conducted with operational Air Force launch systems. Three successful tests

demonstrated the combined warhead and missile operation and provide the necessary confidence on the W84 design as production dates proceed.

## ***Technical Accomplishments 1982***

Continuing a LAB NEWS feature begun two years ago, *Technical Accomplishments 1982* sums up what we, Sandia National Laboratories, consider our principal technical accomplishments for the year just past.

Accomplishments summarized here have been submitted by technical organizations in Albuquerque, Livermore, and Tonopah. The responsible department is given in parentheses following each item. No attempt has been made to rank items.



WARHEADS (Mk21 RV/W87) for the Air Force MX strategic missile system are readied by an AVCO technician for structural ground tests. Engineering Development of the warheads is centered in Department 8130. (AVCO photo)

## Weapon Systems

- Engineering development of the Mk 21 RV/W87 warhead for the Air Force MX strategic missile system began in February. Major warhead structural ground tests have been completed in preparation for the first MX test flight in 1983. (8130)

- The W84 Ground Launched Cruise Missile (GLCM) warhead underwent electrical and mechanical system and subsystem laboratory tests, along with associated analyses to evaluate the W84 design. W84 test units were ground tested jointly with the GLCM system elements; these tests successfully verified the warhead/missile interface compatibility. The development program was highlighted by the completion of W84 flight tests with operational Air Force GLCM and launch systems. These successful and important flight tests demonstrated the combined warhead and missile operation and provide the necessary confidence in the W84 design as we proceed toward production dates. (8160)

- The Scabbard Code, which is a selective military function Corps war game, was brought into production status with emphasis on deep battlefield movements. Scabbard has been used to analyze Corps Support Weapon System employment situations, intelligence resource impact, and conceptual weapon utilities. (8320)

- A new solvent-removable polyurethane casting resin has been successfully employed in the Roll-stabilized Inertial Measurement System (RIMS) electronic assembly. This is the first program that has employed this Sandia-developed encapsulant. The advantages of this casting resin over the existing removable foam encapsulants are: 1) higher mechanical strength; 2) higher use temperatures (160°C); and 3) superior bonding. One RIMS assembly consists of 13 individually encapsulated units. The cost of such an assembly is nearly \$25K; consequently, the rework feature provided by our encapsulant results in a considerable cost savings. (7470)

- A family of silicon photodiode neutron detectors has been developed to both enhance the detection sensitivity and provide a directional response. These small analog detectors are used to monitor the performance of weapon system neutron generators during JTA (joint test assembly) flight tests. (2560)

- Approximately 100 telemetry systems have been flown in the past year for three weapon development programs and seven post-development or Joint Test Assembly programs. Of the 11,000 data points that were instrumented, data were lost from only 200 of these due to telemetry system malfunctions. This is a data return rate of 98 percent. (8460)

- A dual six-port microwave network analyzer was developed by the Primary Standards Laboratory based on a design proposed by the National Bureau of Standards. It has been shown to have accuracy comparable to that achieved by NBS and to repre-

sent an order of magnitude improvement over the commercial system which has been in use for approximately seven years. (2550)

- Of increasing importance in Sandia weapons design activities is the assurance of materials compatibilities. Quality Assurance undertook an extensive study in this area during B83 early development phases. Results showed that the combination of Sylgard potting and MX13-71 case material generated quantities of hydrogen. This discovery led to the inclusion of a hydrogen getter in all production B83 fire sets. (7410)

- We have found a variation between spools of nominally identical Kevlar 49 fiber. This variation produces major differences in failure life of advanced composite materials and is responsible for much of the scatter previously thought to be inherent in creep rupture data. By accounting for it, we can considerably improve the reliability of life predictions for composite pressure vessels. Interest in this discovery has generated a joint program with DuPont (the Kevlar manufacturer) to determine the material cause of the variability. (1810)

- We developed a thermoviscoplastic model capable of describing material behavior over medium to high strain rates at various temperatures. An equation describing adiabatic temperature changes was included in the model to determine effects of thermal softening. The model, using constants determined for stainless steel, was implemented into DYNA2D, an explicit two-dimensional finite element structures code. The model is currently being used to predict the deformation of the B83 nose during impact. These continuing studies aim at utilizing more accurate description of material behavior in the nonlinear analysis of weapon structural response. (8120)

- The capability of measuring in-flight base pressure on an artillery projectile has been developed and successfully flight tested. This appears to be the first time flight base pressure has been measured on a spinning artillery projectile without a sabot. A unique passive mechanism was employed to protect the sensitive in-flight pressure instrumentation system from the extreme in-gun environment during firing. (1630)

- In previous years, the concept of obtaining continuous navigation updates using a stored topographic map, a radar altimeter, and a unique Kalman filter data processing algorithm has been studied for application to several types of aircraft. In 1982, the concept was successfully applied to land vehicles. (1620)

- The B83 Modern Strategic Bomb is designed for greatly improved safety, flexibility and control, and for delivery by several aircraft. Most Sandia components are completing their pre-production activities in support of the first war reserve shipments. The system test program accomplished flight tests and ground impact tests this past year. The mechanical structure and electrical

systems are performing as designed; additional development work is continuing on the 46-foot parachute. (8150)

- Design has been completed for a radiation-hardened CMOS (Complementary Metal Oxide Semiconductor) LSI (Large-Scale Integrated circuit) microprocessor chip set emulating the Intel 8085 CPU (Central Processing Unit), 8155 RAM (Random Access Memory), and 8355 ROM (Read-Only Memory) with four auxiliary interface circuits. The SA3000 CPU functions properly after  $2 \times 10^6$  rads. The new unit represents a significant improvement over preceding generations of microprocessors. (2110/2140)

- For various weapon and satellite systems, we designed 11 radiation-hardened large-scale integrated circuits; six custom logic circuits for the ROADS (Range Optimal Advanced Development System) radar; two data acquisition circuits (one with multiplexed analog/digital converter); a Scalar circuit for satellite application; and two cryptographic circuits. (2110/2140)

## Energy

- We studied soot formation in premixed laminar flat flames, measuring soot particle size, number density, and particle temperature with a combination of optical diagnostic techniques. In situ, spatially resolved measurements of soot particles as small as 20 nm diameter were made — the smallest such measurements that have been reported. Recently a high-pressure laminar diffusion flame burner has been designed and constructed; it is being used in a collaborative project with a visiting professor from Stanford University to study pressure effects on the structure of sooting flames. (8510)

- Sandia's gun-launched Instrumented Seabed Penetrator (ISP) was successfully tested in the Gulf of Mexico. Instrumented projectiles were fired to depths of 90 and 125 feet in the marine sediments, and data were telemetered to the surface by wire and acoustic communication links. Results are applicable to seismic exploration and offshore structures as well as certain defense-related systems. (1620)

- We have used multiphoton optogalvanic spectroscopy (in which an atom or molecule is resonantly excited by two or more photons and then ionized by another photon) to detect atomic hydrogen and oxygen in flames. These atoms are present in flames at concentrations of only a few parts per million and have previously been difficult to detect, but they play a very important role in the chemical processes occurring in combustion. (8340)

- The last of a series of nine photovoltaic intermediate-sized application experiments under the technical direction of Sandia was completed in June. This 225 kW system, located in Phoenix, is the largest of the nine experiments and utilizes a point-focus Fresnel lens concentrator array based on a design originated by Sandia. The present array design, which was developed by Martin Marietta under contract to Sandia and installed

at the Phoenix site, represents the world's most efficient large-scale photovoltaic system. To date the system has exceeded the performance design goals, producing over 230 kW peak output. (9720)

- Under the technical management of Sandia, several major milestones were accomplished at the 10 MWe solar central receiver pilot plant (Solar One) located near Barstow, California. Electricity was delivered to the Southern California Edison Company grid for the first time on April 12. The plant exceeded its power rating by delivering 10.4 MWe net on Oct. 10. The plant was formally dedicated on Nov. 1. (8450)

- Research continues on quantifying the threat to containment from severe nuclear reactor accidents. Work this year focused on quantifying explosive gas and aerosol generation when hot solid core debris interacts with reactor base mat materials. Results indicate vigorous attack of concrete does not stop when debris solidifies, contrary to general assumptions in current safety analyses. Furthermore, readmission of water appears to have no appreciable effect on these interactions so generation of non-condensable and flammable gas continues unabated. Considerable effort has gone into experimental and analytic studies of the feasibility and design limitations of molten core retention devices to significantly reduce gas generation and fission product release from core melts. (9420)

- The construction and checkout of the world's largest solar total energy, or cogeneration, plant was completed in 1982. The project, a major element of DOE's Solar Thermal Technology Program, is the Solar Total Energy Project at Shenandoah, Georgia. The project, which furnishes electrical power, process steam, and air conditioning to a nearby knitwear factory,

is the responsibility of DOE/AL with Sandia providing technical direction and management support. Sandia is also responsible for training the operating staff of the Georgia Power Company, which took over as operating agent last summer under a cooperative agreement with AL.

The Shenandoah system consists of a collector field containing 114 parabolic dish collectors that supply thermal energy at 750°F to drive a 400kW multi-stage steam turbine. Some steam is extracted from the turbine and fed directly into the central steam line at a demand-controlled rate of up to 1.5 million Btu per hour. Exhaust steam powers a 250-ton absorption chiller. (9720)

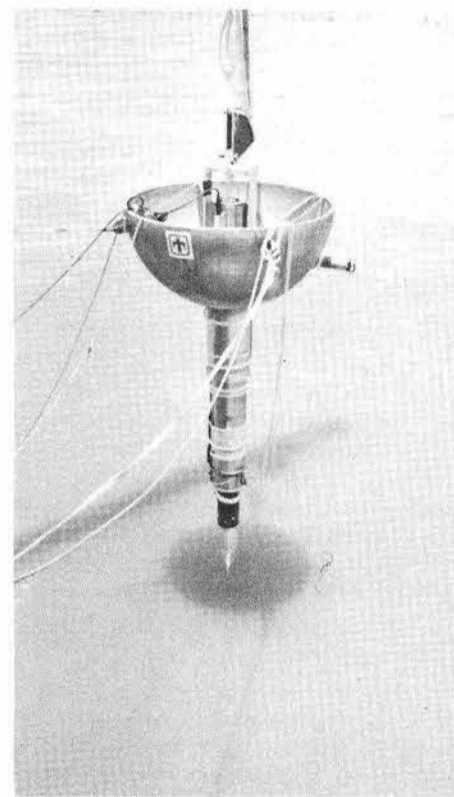
- The B61 Mobile Data Acquisition System has been recording information from two large oil shale retorts near Grand Junction, Colo. Two computing systems are being used in the facility. With approximately 1200 channels of data being recorded, it has been possible to record with one computing system and to simultaneously analyze data with the second one. Operation in this mode provides retort operators with the critical real-time measurements from which control decisions are made. (7120)

- A process for continuously applying black chromium to solar collector pipes was developed in the Plating Lab. Pipe moves through a liquid-filled cylindrical chamber which acts as an electrode. A patent application has been filed. (7470)

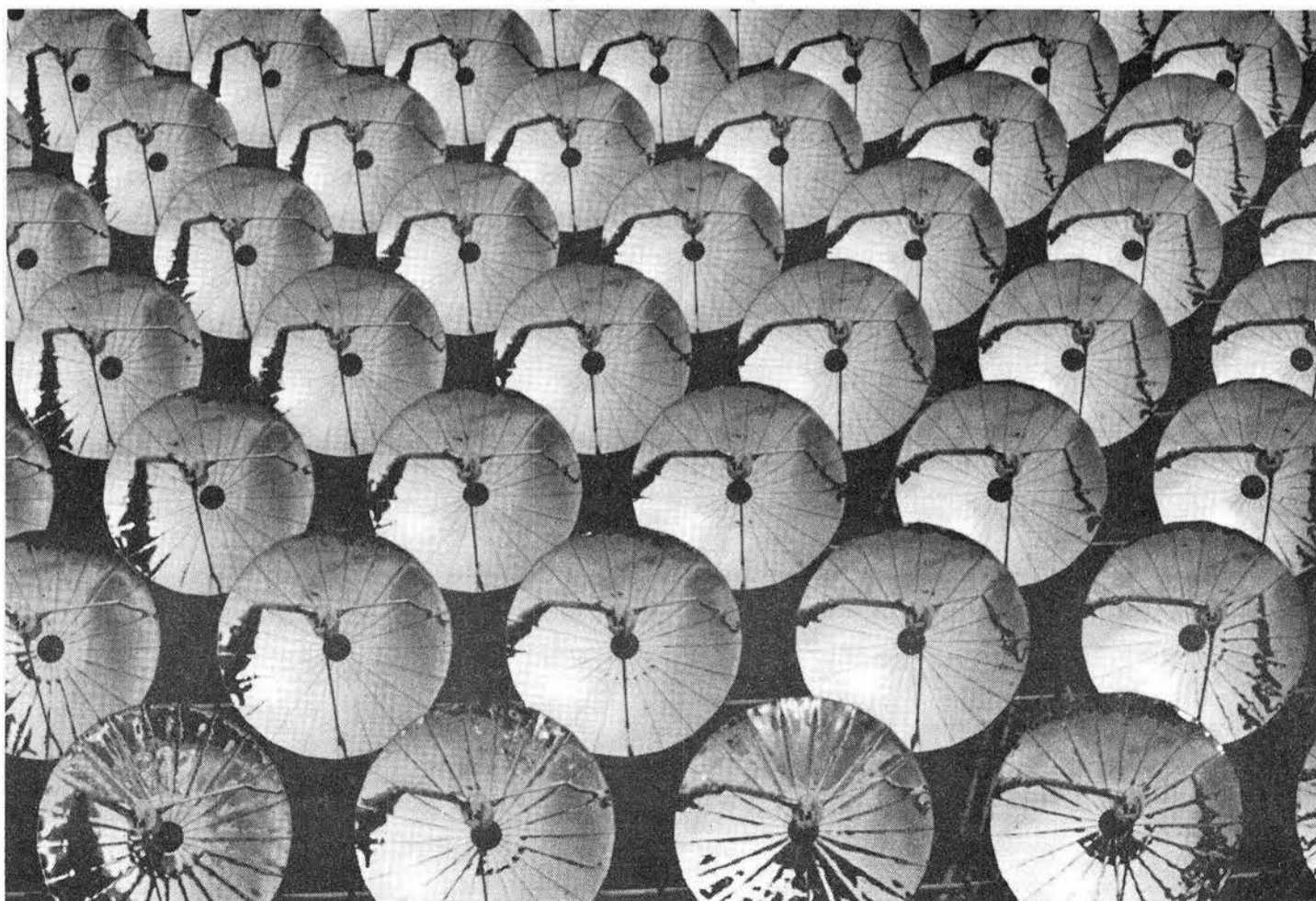
- A high-pressure combustion, direct contact steam generator for use downhole in thermal enhanced oil recovery was developed and successfully tested in an oil field in Long Beach, Calif. Operation at 3 to 4 million Btu/hr was carried out for 4½ months with a system availability of 80 percent. Overall system control, including parameter adjustments,

automatic shutdown, and reliable restarts, was clearly demonstrated. Gas communication was measured with adjoining production wells and, while no overall oil production increase was noted, production in one of the wells did increase significantly. (9750)

- Novel classes of catalysts based on hydrous oxide ion exchange compounds, developed at Sandia, have shown that substantial coal conversion activity and efficient hydrogen management can be attained under

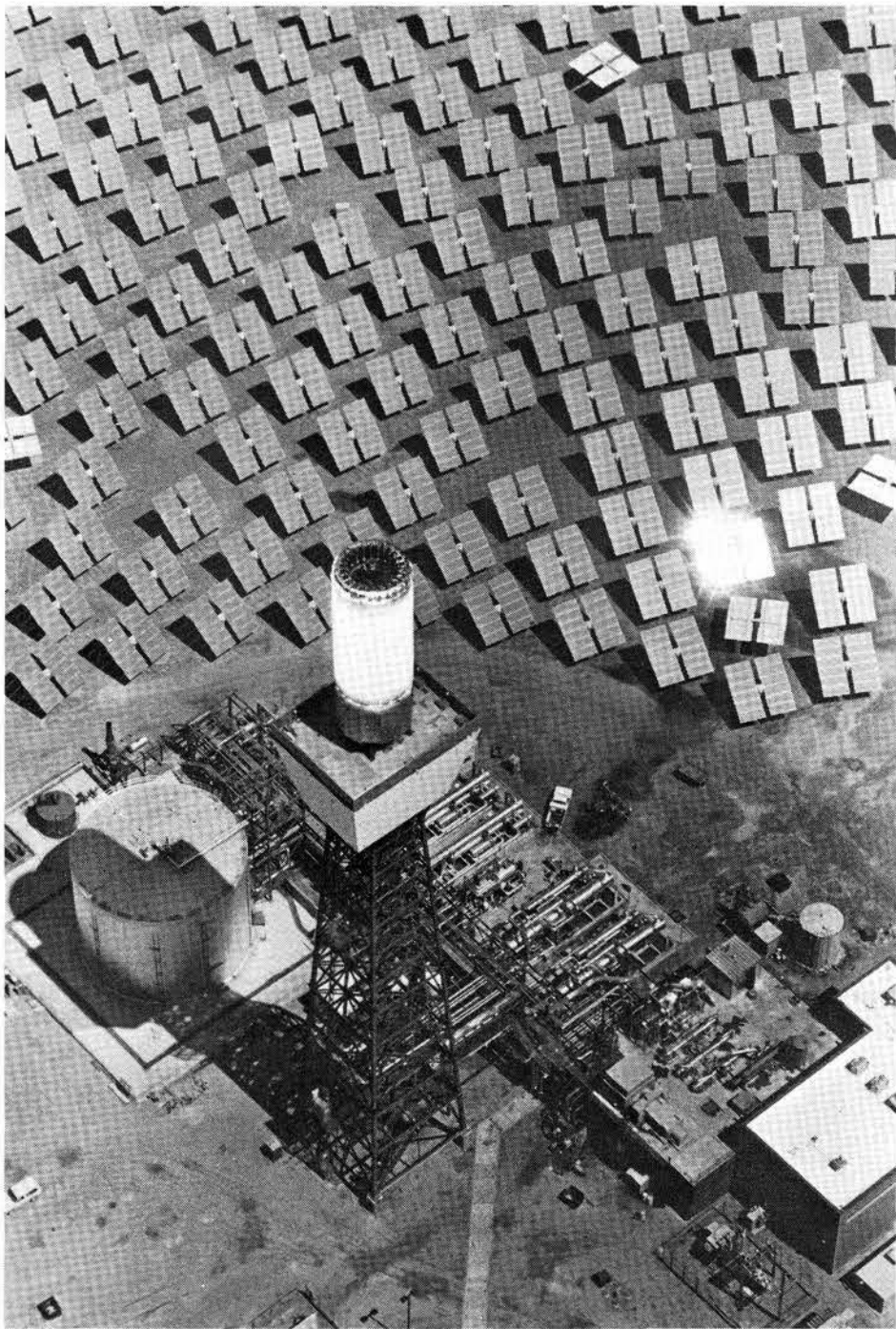


GUN-LAUNCHED Instrumented Seabed Penetrator was successfully tested in the Gulf of Mexico. Instrumented projectiles are fired to depths ranging to 125 feet, and the data telemetered to the surface by wire and acoustic communication links.



PARABOLIC DISH COLLECTORS, seven meters in diameter, form the solar collector field for the world's first solar total energy plant at Shenandoah, Georgia. The 114 collectors in the system provide thermal energy at 400°C to drive a 400 kW multi-stage Rankine cycle turbine for gen-

eration of electricity and to provide steam for knitwear manufacturing processes. The system was completed in 1982 under Sandia technical direction and management support.



SOLAR ONE, a 10 MWe central receiver pilot plant near Barstow, Calif., delivered power to the Southern California Edison grid for the first time April 12. The plant exceeded its power rating by delivering 10.4 MWe net on Oct. 10. Sandia provides technical management for the project.

coal liquefaction conditions. Experiments with the titanate system showed up to a 75 percent increase in conversion to product (oil) compared with uncatalyzed experiments. These catalysts could significantly improve in several areas of coal liquefaction technology, including slurry-phase catalysis and upgrading of coal-derived intermediate products. (9740)

- We have recently developed and successfully tested an inertial navigator for directional surveying of oil and gas wells. The system uses gyros and accelerometers to obtain survey errors of less than 10 ft. in a 10,000-ft. well. The tool, which communicates with a computer at the surface, is 4 in. in diameter and 20 ft. long. The concept and hardware are based on a system developed by Sandia for flight vehicles. (2330)

- The application of thin sol-gel glass coatings to black chrome solar selective films has improved the lifetime of the black chrome when operated at high temperatures ( $\geq 300^\circ\text{C}$ ). The sol-gel coating consists of a borosilicate glass composition that is applied from a liquid solution using a simple dipping process at room temperature. After the coating is fired for a few minutes at  $450^\circ\text{C}$ , a glass protective layer is obtained. Sol-gel coated black chrome films have maintained acceptable optical properties 2.7 times longer than unprotected films after thermal aging. (1820)



WORLD'S MOST EFFICIENT large-scale photovoltaic system, based on a design originated by Sandia, produces more than 230 kW peak output. It was developed by Mar-

tin Marietta and installed at a site in Phoenix under Sandia technical direction.

- A new, detailed, and comprehensive chemical kinetic model for acetylene oxidation was developed to elucidate the processes whereby soot and polynuclear aromatic hydrocarbons are formed in practical combustion devices. The accuracy of the model was improved by comparing experimental results with computed predictions of flame speeds, flame structure, and ignition delay times. The resultant new model, consisting of some 100 elementary reactions, will serve as another powerful tool in research focusing on the chemical and fluid mechanical mechanisms leading to particulate formation in flames. (8510)

- Hydraulic pressure pulses produced by explosives can be tailored to produce formation cracking, which is highly conducive to increased production. A computer analysis of the hydraulic fracturing process has been developed. This program can identify combinations of well geometrics, pulse types, and formation materials that are likely to produce the desired fracturing effects. (1520)

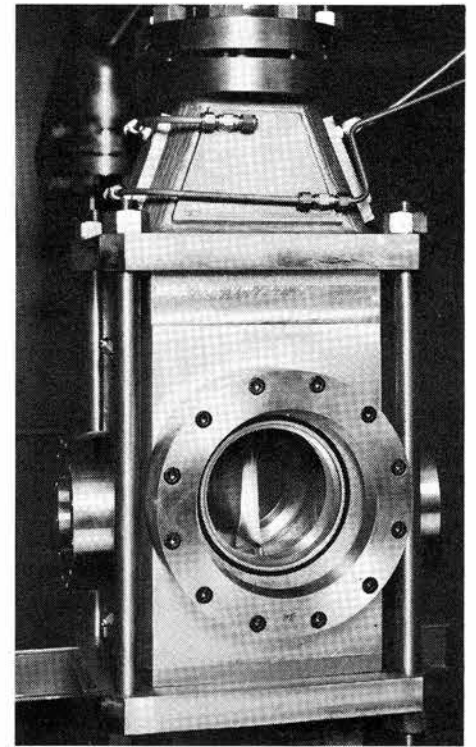
- Two real-time particulate mass monitoring systems have been developed and demonstrated in power plants. The first, a total mass loading system, was demonstrated by Tennessee Valley Authority's Shawnee Steam Plant. The second was tested at the pressurized fluidized bed combustor at Curtiss-Wright using a set of cyclone devices to obtain particle mass and size distribution information. (8520)

- The production of oil storage space for the Strategic Petroleum Reserve requires the solution mining of caverns in Gulf Coast salt domes. We developed a computer code that simulates the formation of leached caverns. This code has been used extensively in cavern design for the SPR both for designing an initial cavern and for predicting cavern shape changes during oil withdrawals. This code is being used by contractors for

the SPR and has been requested by private firms engaged in solution mining. (1510)

- Burning rates of pulverized fuels were determined for the first time from measurements of the surface temperature of individual reacting particles under combustion conditions. The functional variation of burning rate with temperature was used to distinguish the effects of reaction kinetics, pore diffusion, and bulk diffusion. (8520)

- Security systems were designed for the Strategic Petroleum Reserve's five storage sites and one trans-shipment terminal located in the Louisiana and Texas Gulf Coast area. The designs stress commonality, low maintenance, and minimal false alarm rate in the site environments.



A HIGH-PRESSURE laminar diffusion flame burner is a new apparatus designed and constructed by Department 8510 to study pressure effects on the structure of sooting flames.

# Technical Accomplishments 1982

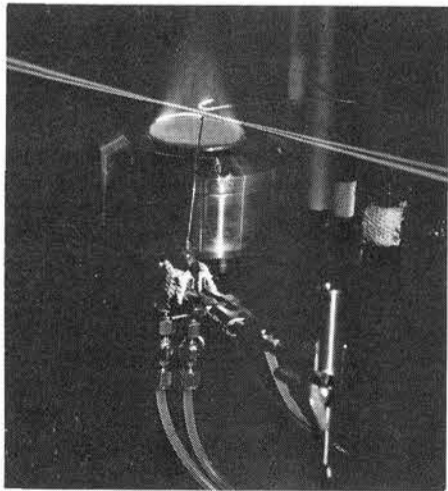
These are currently being installed. A security system for a new storage site near Port Arthur, Texas, is currently in the design stage. (9260)

- We developed a computer-controlled data acquisition system for gathering data on thermal solar systems under the MISR (Modular Industrial Solar Retrofit) program. This program involves qualification testing of industry-supplied systems designed to provide 3 million Btu per hour of steam at 250 psi for industrial applications. The major benefit of the MISR program will be the characterization of commercial systems with accurate performance data that will permit realistic private investment decisions in alternative energy sources. (2310)

- We have combined laser diagnostics and computer modeling to characterize trace radical species (NH, OH, and NO) and to elevate chemical kinetics in a  $H_2/N_2O$  flame. Results from this joint study with Exxon have provided insight into the chemical reactions responsible for the production of the NH radical in  $N_2O$  supported flames. These data were needed by Exxon to refine its emission control technologies. (8510)

- Modal characteristics, i.e., how a structure vibrates, must be considered in selecting the operating speed of vertical axis wind turbines due to the cyclical loading on the blades. An experimental technique has been developed and successfully applied to the Sandia 2-meter wind turbine while it rotated at speeds up to 600 RPM. Prior experimental work was limited to stationary structures. Several technical problems had to be solved before input force data and response data from strain gages on the structure could be processed by a minicomputer system to extract the modal characteristics. (7540)

- A unique facility for studying tritium plasma interactions with materials in fusion devices has been used to experimentally confirm calculations of plasma-driven tritium permeation through stainless steel vessel walls. These calculations are based on DIFFUSE, a comprehensive plasma permeation code. They indicate low permeation with high tritium inventory (~3kg) for near-term fusion reactor design, but significant permeation (>10 g per day) through the walls of future power-generating reactors. (8340)



MULTIPHOTON OPTOGALVANIC spectroscopy (in which an atom or molecule is resonantly excited by two or more photons and then ionized by another photon) used by Department 8340 to detect atomic hydrogen and oxygen in flames.

- A new generation coded switch for the Ground-Launched Cruise Missile (GLCM) went into production during the past year. The new switch not only accomplishes the usual warhead security functions but also enhances the launch control system at a lower cost than previously designed coded switches. (2330)

- A passive recording accelerometer system (MC3674) consisting of an electronics package and a triaxial crystal accelerometer has been developed. The system will record shock signatures associated with the maximum values experienced in each axis. The recorded shocks, up to a maximum of  $\pm 300$  g, will remain in the volatile memory for up to 45 days. The component is used to record impact and postflight handling shocks of the W84/JTA Ground-Launched Cruise Missile. (7540)

- Ion implantation of titanium and carbon has been found to significantly reduce the friction and wear of stainless steel surfaces. Reductions of about 50 percent in the friction coefficients are due to amorphous layers on the surface that were produced by the implantation process. The presence of titanium and/or titanium carbide particles partially explains the reductions (of up to a factor of 20) in the wear rates. (1110/1830)

- A computer-based welding research facility is being used to develop automatic welding control techniques and improve weld quality. Initial observations have revealed a correlation between weld penetration and the intensity of light emitted from the root side of the weld. Work is now underway to use this correlation to govern weld penetration in full-thickness sphere and tube girth welds by applying computer control techniques. (8410)

- Mylar capacitors currently function as the weak link in most fire set systems; they are designed to fail at a source temperature of 290°C. For some system requirements, mica paper is used, which in a standard design would not function as a weak link. A new mica-paper/mylar composite design meets the performance requirements of the standard mica capacitors but still functions as a reliable weak link for nuclear safety. (2150)

- Missile compatibility tests have been completed on a combination Trajectory Sensing Signal Generator and Programmer for the Navy Standard Missile 2 W81 Warhead. This subsystem is the most sophisticated of this type ever designed, assessing weapon trajectory and controlling warhead functions and internal safety devices from prelaunch through target intercept. (2330)

- We have designed and developed new control equipment that streamlines the management, handling, and verification of classified information used in releasing nuclear weapons. The new controller is based on microcomputer technology and incorporates an electronic cryptographic system, advanced data processing techniques (including error detection

## Components

and correction), bubble memories, and large-scale integrated circuits. (2330)

- A task group of structural analysts, ceramicists, metallurgists, and experienced project engineers with cooperation from Mound Labs was asked to design an actuator. It was to have the same external geometry as an existing one but was to hold 700 MPa (100,000 psi) rather than the existing 190-400 MPa capability. A new set of compatible materials and an exhaustive set of over 60 structural analyses produced a design in one month which on paper met the design goals. Preliminary liquid pressure tests on prototypes show survival at 1000 MPa. Much work remains, but the design group concept and heavy reliance on analyses were shown to be fast and effective. (1520)

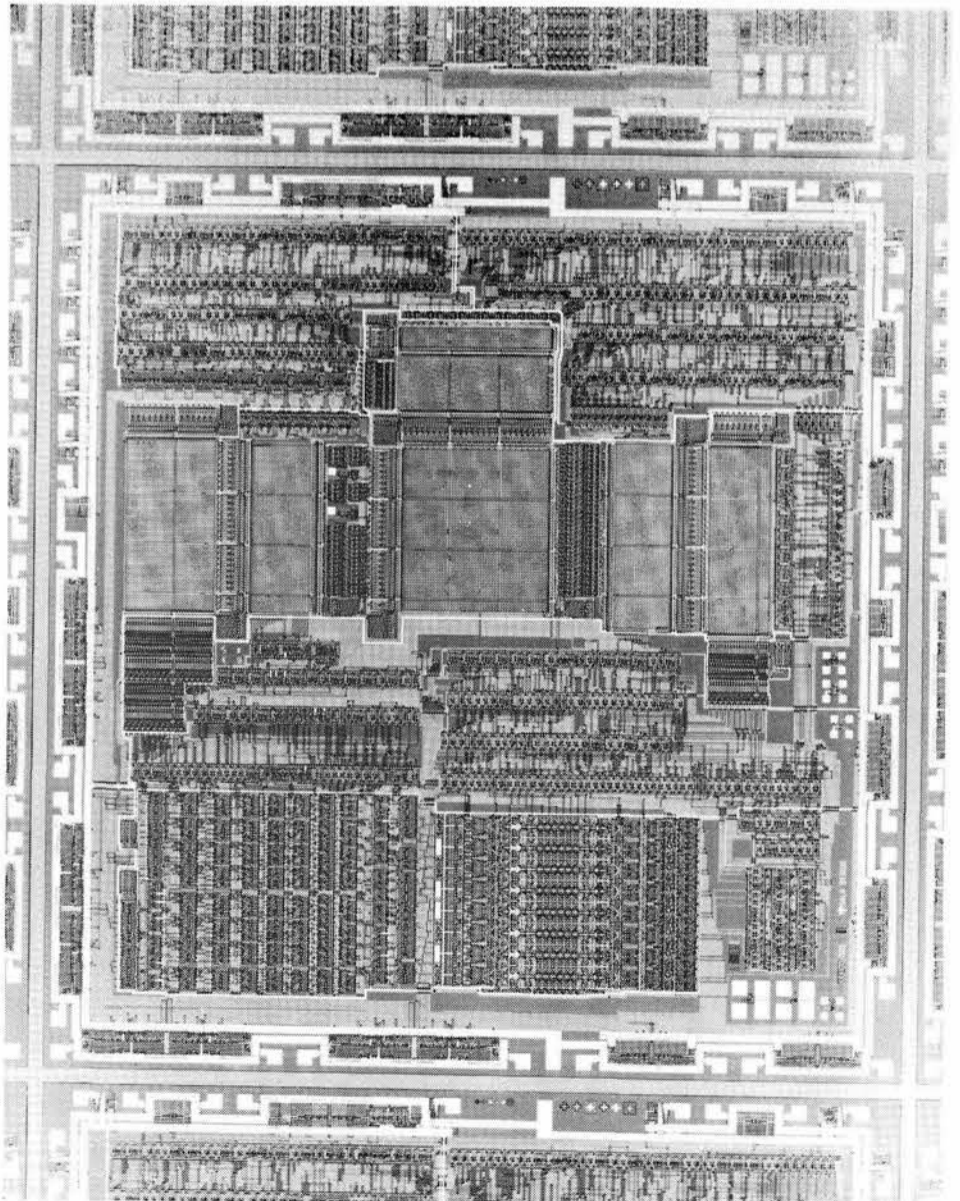
- In 1982, magnetic bubble memories, though available from only one commercial source, have evolved into a reliable and available technology. We have led industry and the military in working with the supplier in developing high-reliability systems with broad temperature ranges ( $-40^\circ\text{C}$  to  $+90^\circ\text{C}$ ). (2120)

- A complete redesign of the RIMS (Roll-stabilized Inertial Measurement System) II stable platform IMU

(Inertial Measurement Unit) electronics and Input/Output (I/O) module was performed achieving substantial volume reduction (60 percent) and circuit simplification. The new IMU design, called Mini-RIMS, has been optimized for Sandia's flight vehicle operation of a prototype Mini-RIMS and attitude control applications. Successful operation of a prototype Mini-RIMS was demonstrated and efforts were started to establish a commercial supplier for continuing production. (2330)

- We developed two nonvolatile MNOS (Metal-Nitride-Oxide Semiconductor) memory chips in the past year. The first circuit is a fast-write metal gate 1K RAM (Random Access Memory) which can be programmed in excess of 10,000,000 times without fatigue. The second is a silicon gate 16K EAROM (Electrically Alterable Read-Only Memory). Both circuits are CMOS (Complementary Metal Oxide Semiconductor) and radiation tolerant. (2110)

- A high-power thermal battery has been developed for special applications. The new battery provides 60 amperes for 10 minutes at 30 volts. Few, if any, thermal batteries have produced these output levels before. (2520)



RADIATION-HARDENED CMOS microprocessor, less than quarter-inch on each side, offers major improvement over preceding generations of similar units.

## Testing

- A new and unique irradiation cavity has been added to the Annular Core Research Reactor (ACRR). The fuel-ringed external cavity consists of a dry, 15-inch-diameter tube surrounded by fuel elements arranged in a U-shaped pattern. The cavity is positioned adjacent to the ACRR, and the fuel elements provide better simulation of endo-atmospheric threats. The cavity is used for neutron hardness certification of strategic weapon systems in joint programs with other laboratories. (9450/9330)

- A new mode of operation for the Hermes II gamma-ray simulator has been developed; it allows outdoor testing of very large devices. This new mode entails transporting the Hermes II electron beam along a drift tube to a point outside the building where the beam pulse is converted into bremsstrahlung radiation. Large Army vehicles have been tested this way during the past year. (1230)

- The SANDUS (Sandia Digital Underground System) was operated over a fiber optic link at NTS. The system successfully acquired digital data from downhole. Time history plots in engineering units were made available to the experimenters within one hour after the test was conducted. (7120)

- Nine computer systems (10 buildings) in Tech Area III have been linked via a fiber optic cable network capable of up to 20 megabits per second. This provides the test engineer with access to data at remote sites from the main engineering office. Other benefits include resource sharing between systems, remote monitoring capability, remote test setup capability, video monitoring, and analog data. (7520)

- A method has been devised that permits vertical and horizontal ground motion time histories (waveforms or seismograms) at locations deep below the ground surface to be predicted from corresponding motion measured at the surface directly above these locations. This method aids in predicting the ground motion environment to which a deep nuclear waste storage facility at the Nevada Test Site would be subjected by underground nuclear weapons tests. The predicted environment can then serve as a basis for design criteria for the waste facility. (7110)

- A large, high-pressure vessel with four windows for optical access was required for flow visualization experiments. The design, analysis, and testing of this pressure vessel have been completed. Because of the complexity of the analysis due to the four windows, a scale model of the complete vessel assembly was built and tested to determine its performance capabilities and factor of safety. Finally, a full-scale vessel was instrumented with strain gages and proof-tested to verify the analysis and scale model test results. (8120)

- In the New Material Stockpile Evaluation Program, 250 laboratory tests, over 100 joint flight tests and other examinations (e.g., reacceptance, repair, field inspection reports, etc.) were completed and provided satisfactory results. A new spin facility capable of spinning 1500 pounds at up to 25,000 rpm is now operational.

One hundred slip rings are available for monitoring during spin. (7420)

- A new windfinding radar system was installed at the Tonopah Test Range during FY82. This low-cost, X-band system is specifically designed for wind measurements and emphasizes differential accuracy rather than absolute space position data. The system has been deployed in a highly mobile configuration and is designed to support off-range activities as well as TTR-based test operations. An integral radiosonde receiving capability is coaxial with the radar tracking antenna. This allows monitoring atmospheric conditions up to an altitude of 120,000 feet and provides zonal wind data to the same level. (7170)

- An x-ray technique, using a portable x-ray machine and Polaroid x-ray film, was developed to inspect weapons without requiring weapon disassembly. A Sandia team performed the x-ray inspection of a large number of weapons in the field, including several in foreign countries. (7210)

- A Telemetry Instrumentation Trailer and an Operations Control Trailer have been reconfigured to operate independently or together. When configured together, they provide a direct sheltered passage between the instrumentation data processing room and spaces utilized for launch control, communications center, and office activities necessary to the support of field operations. The combination can be set up by two operators in a short time. (7130)

- To support DOE/AL's need for data describing the capability of a "Gravel Gertie" weapon assembly structure (designed to confine radioactive aerosols in the event of accidental detonation), we designed a full-scale experiment at NTS that included external and internal aerosol samplers, and implosive aerosol generators and pressure measurement. We confirmed operations of all subsystems, had the test configuration built, and completed the test successfully within eight months. (9780)

## Computing

- The CRAY 1S super computer was installed and put into operation at Albuquerque during the first quarter of 1982. Sandia's 1S currently has 10<sup>6</sup> 64-bit of solid state memory and is rated as a 20 megaflop computer. This Class VI number cruncher has four times the computer power of a Control Data Cyber 76 mainframe. (2630)

- We have developed a new approach to solving a class of difficult computational problems that commonly arise in science and engineering. The problems are those involving not just differential equations but a mixture with nonlinear algebraic equations. These mixtures occur surprisingly often — for instance, in connection with partial differential equations — but satisfactory techniques for their solution have been lacking. To deal with this class of problems, we have developed the underlying mathematics, devised new computational algorithms, and published a computer code called DASSL (Differential-Algebraic Solver, Sandia Labs). This is now being used to solve problems in weapons component design, solar applications, chemical vapor deposition, combustion chemistry, and gas dynamics. The computer code has also met with considerable success outside Sandia on problems arising in space shuttle flight dynamics, magma flow in volcanoes, and electrical network design. (8330)

- The TACO (Thermal Analysis Code) heat transfer code has been modified and extended to provide increased capability, efficiency, and ease of use. Some of the new features included in the code are three-dimensional analysis capability, master/slave surfaces, and electrical resistance heating. In addition, free-field data is now allowed for easier user input. TACO is currently being utilized in several areas of application. Particularly heavy use of the code is being made in the MX thermal analyses and in the resistance weld-

ing studies of the Welding Working Group. (8120)

- The Building 821 Tech Control Center is now fully operational and is adding terminal and host access to the switching network. This Center is designed to handle up to 2000 circuits internally. It can also remotely monitor data activity and diagnose all other circuits in the Sandia network. In addition, it can perform an analysis of any phone circuit in the country should the need arise. (2610)

## Safeguards

- A new generation of unattended, tamper-resistant, closed circuit television systems has been developed for use by the International Atomic Energy Agency in Vienna. Six of these advanced systems were delivered to the IAEA and are now undergoing long term operational test and evaluation. They will be used to monitor critical activities in nuclear facilities to help ensure that the facilities are being used only for peaceful purposes. (9250)

- In cooperation with Canadian and West German agencies, we have developed a microprocessor-based seal pattern reader (SPAR) and related ultrasonic sealing techniques that are now being applied to seals attached to light water reactor fuel assemblies and spent fuel storage racks in CANDU reactors. Testing is underway in all three countries (including the U.S.) to ensure that the reader and associated seals will operate satisfactorily in the wide range of operational environments required. (9250)

- A chemical system that provides much greater stability for aqueous foams from low viscosity solutions has been discovered. It is being used to develop medium- to high-expansion-ratio foam systems for Safeguard and NEST (Nuclear Emergency Safety Team) applications. Tests that measure liquid drainage from the foam have shown a tenfold decrease in drainage rates when compared to commercially available foam systems. Early experiments indicate that the unusual stability is the result of ordering, possibly liquid crystal formation, that occurs when a water soluble polymer and a fatty alcohol stabilizer are added to a surfactant solution. A patent application has been filed on this foam system. (1810)

- Aqueous foams have been found to have unusual capabilities in mitigating blast pressures and impulses and the residual gas pressures that result from high explosive detonations. Both analytical and experimental efforts have been conducted to characterize this behavior. (9210)

- In a development program to improve the uniformity and usefulness of guard towers used within DOE nuclear facilities, we have devised a cost-effective guard tower design that uses precast, prestressed concrete members for wall columns and has precast concrete floors, cab walls, and roof. It uses materials and techniques that are easily available in most of the world; the design has excellent resistance to wind, weather, seismic forces, and provides small

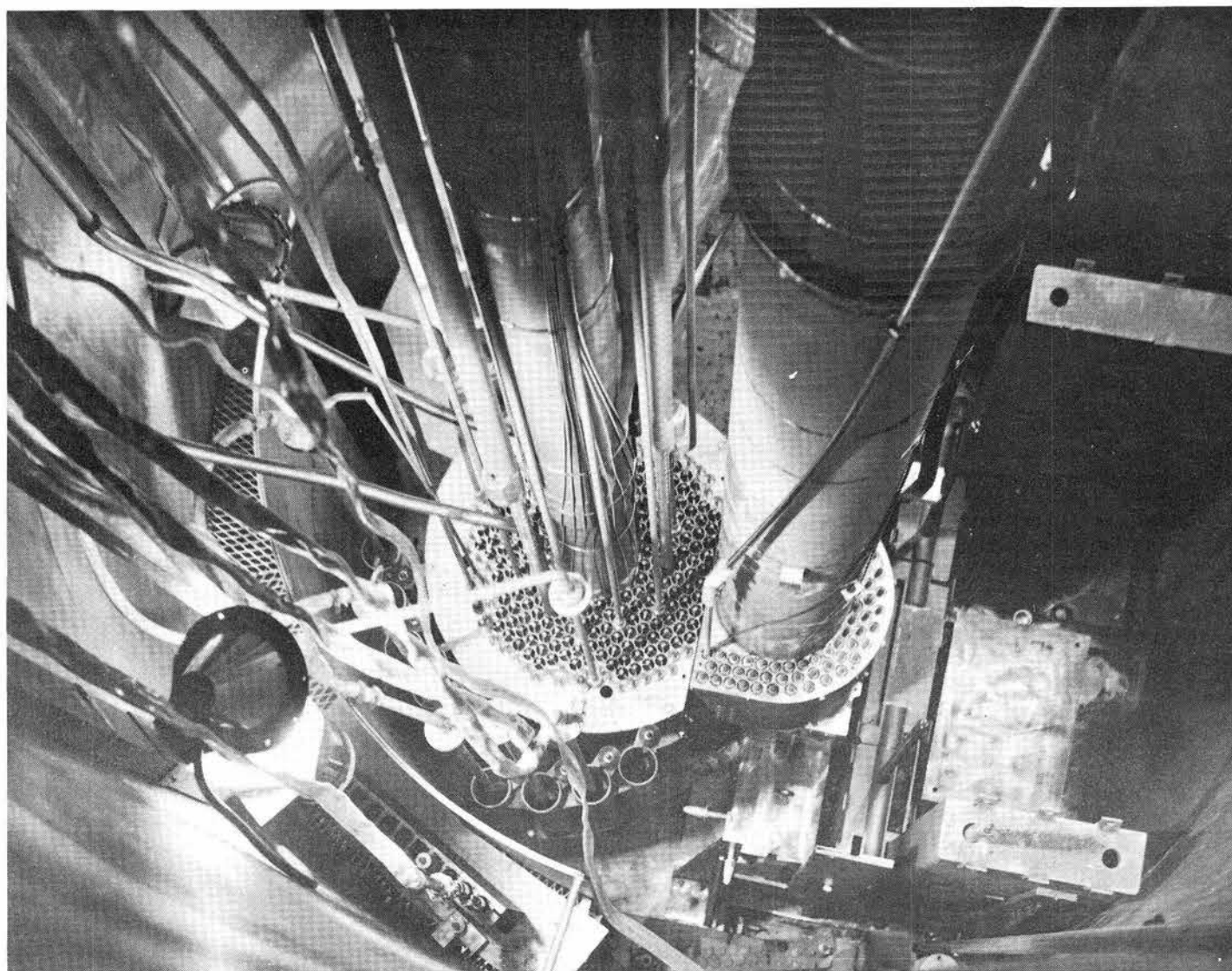


OUTDOOR TESTING of very large devices, including rocket launcher above, is now possible with the Hermes II facility. This new mode transports the Hermes II beam along a drift tube to a point outside the building where the beam pulse is converted into bremsstrahlung radiation.

## Research Sciences

- Several reactions representative of important catalytic systems have been studied on chemically modified single crystal surfaces. These reactions are methanation of CO and CO<sub>2</sub>, hydrogenolysis of ethane, hydrogenation of ethylene, and cyclopropane ring-opening and hydrogenolysis. Poisoning of the above reactions by ordered, submonolayer coverages of sulfur on nickel shows large nonlinear effects for sulfur coverage versus reactivity attenuation. These data suggest that the dominant mechanism of poisoning is an electronic one and one that extends over distances larger than the atomic radius of sulfur. Additional studies have addressed the role of potassium promoters in nickel catalysts for methanation. Potassium increases the rate of higher hydrocarbons relative to the clean Ni (100) catalyst. Similar results have been reported for supported nickel catalysts suggesting that support effects play a small role in catalytic promotion by potassium. These studies are an extension of work to be awarded the American Chemical Society's Ipatieff prize in March 1983. (1130)

- The Strained Layer Superlattices (SLS) research program is pioneering a new class of man-made semiconductor materials for making improved electronic devices. The SLS consists of many thin (~100Å) single crystal layers of alternating semiconductor types (such as gallium arsenide and indium gallium arsenide). We have grown these materials and shown that SLS semiconductors have very useful macroscopic properties which can be controlled by changing layer thickness and type. The properties on some of these new materials have been measured, and



A NEW IRRADIATION CAVITY (structure at right) has been added to the Annular Core Research Reactor (ACRR). The fuel-ringed external cavity consists of a dry, 15-inch-diam-

eter tube surrounded by fuel elements arranged in a U-shaped pattern.

arms ballistic protection. (9210)

- We have developed and tested in an operational environment an automated system for inventorying stored nuclear material. Special labels are attached to the containers of nuclear material and are remotely read by a shelf monitor device, which also measures container temperature and condition. (9260)

- A computer simulation program and user's guide has been developed to assess the safety of an area with respect to an airplane crash. The simulation program uses as input the topographical and air traffic pattern description of the area. Aircraft impacts are generated and used to predict the probability that an aircraft will hit a specified structure. (7220)

## Pulsed Power Development

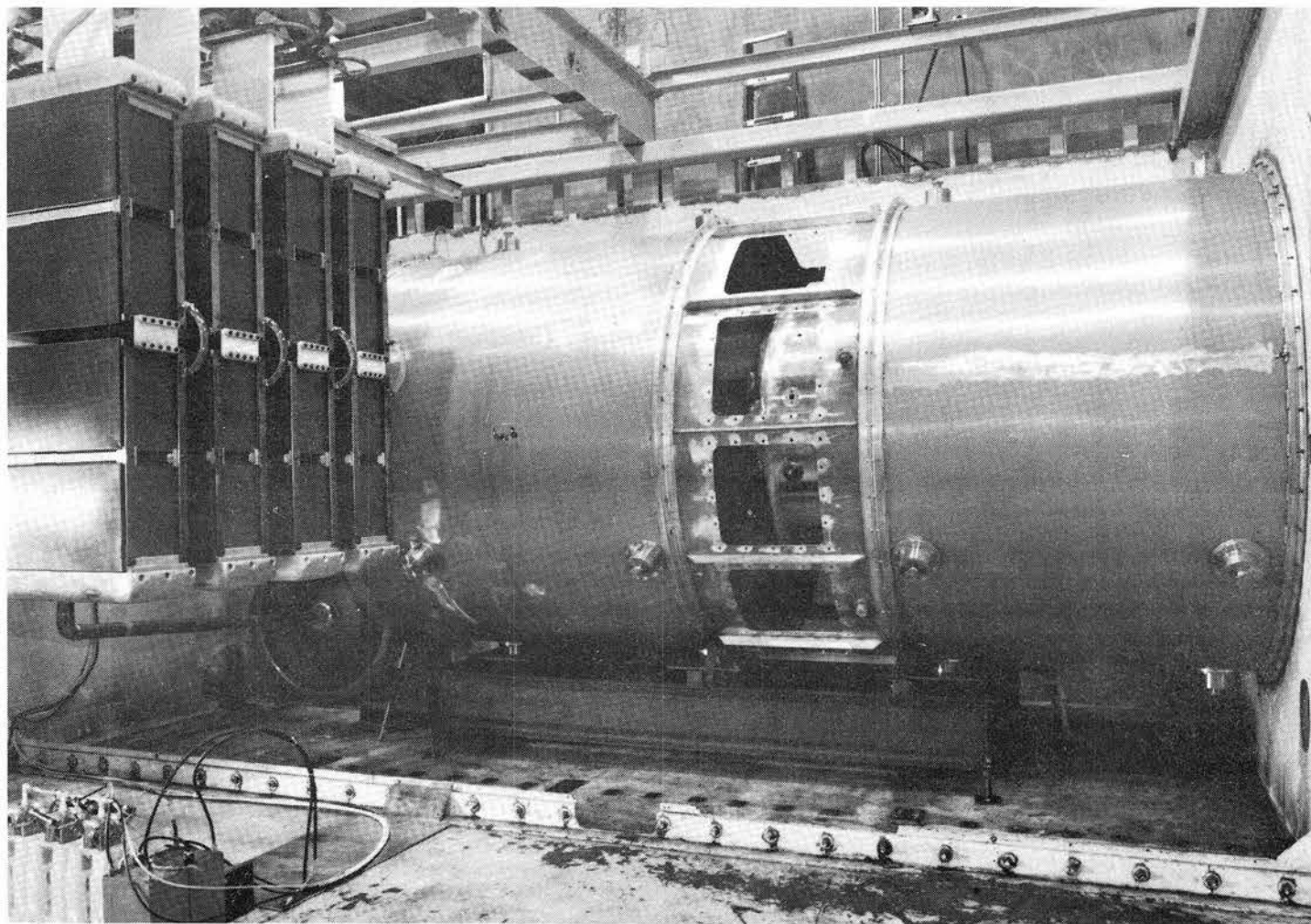
- As the design of the PBFA (Particle Beam Fusion Accelerator) II modular accelerator continues, proof-testing of the major pulsed power components is being conducted on a test-bed accelerator named Demon. The 6 MV Marx generator for Demon has been designed and tested using a resistive load. PBFA II will have 36 modules fired simultaneously, so these units must have high reliability and small firing time error. The firing time uncertainty for this Marx generator was 9 ns, well within acceptable limits for PBFA II. The remaining power transfer and pulse compression components are now being tested in Demon. (1250)

- A new pulsed power accelerator, the IBEX (Isolated Blumlein Experiment), has been developed. Unlike conventional accelerators, which generate a low-level pre-pulse voltage that appears across the diode anode-

cathode gap and usually degrades the performance of the high-voltage diode, the IBEX uses the isolated Blumlein concept to circumvent the problem by not generating any pre-pulse. The unique facility became operational in December. (1240)

- The Applied-B diode passed two important milestones. The first was the demonstration of current-neutralized ion beam transport in regions of a strong transverse-applied magnetic field imbedded in a background

gas. This achievement allows scaling of the Applied-B diode to the 100 TW power level with good ion beam focusability. The second milestone was the demonstration of ion beam brightness values of 30 TW/cm<sup>2</sup>/rad<sup>2</sup> on the Proto I diode. This is within a factor of ten of the required value to PBFA II and leads to optimism because the necessary additional improvement should be achievable just by raising the diode voltage from the present 1.25 MV to 5 MV. (1260)



IBEX ACCELERATOR developed by Department 1240 generates 4 MV, 100 KA, in 20 nanosecond pulses. It circumvents the low-level pre-pulse voltage across the diode

anode-cathode gap that usually degrades the performance of pulsed power accelerators by using an isolated Blumlein concept.

an experimental solar cell has been demonstrated. The wavelength response of the cell was controlled by adjusting the layer thickness of SLS. (1140)

- A new set of experimental and theoretical techniques for analyzing hydrogen isotopes and determining their retention, permeation, and release from materials has been developed. Resistance probes were developed to very sensitively detect the energy and flux of hydrogen at the plasma edge of magnetic fusion devices. Quantitative ion beam methods give hydrogen trap energies and surface recombination rates in iron, nickel, and steels. Ion beam analysis of helium-3 decay products from tritium allow tritium profiles to be determined to the 1 ppm level after exposures of less than two months. Finally, a universal model has been developed which allows hydrogen recycle, inventory, and permeation in the steady state to be given analytically through a transport parameter. (1110)

- We have developed a new laser technique, stimulated Raman spectroscopy (SRS), that will allow molecular chemists to probe the structure and dynamics of molecules on a scale of detail never before achieved. We have demonstrated the power of the technique in a study of the optical excitation dynamics of laser excited SF<sub>6</sub> molecules in a gaseous-free expansion. Our results establish the applicability of SRS to dynamic studies of a multi-photon ex-

citation processes in gas-phase molecular systems. This demonstrated capability should lead the way to eventual Raman probing of other transient molecular species present in a variety of dynamic chemical processes. (1120)

- Small Angle Neutron Scattering (SANS) profiles have been obtained for pure niobium- and tritium-charged niobium samples. Due to tritium decay to helium-3, which remains in the lattice, the SANS profiles were substantially different for the pure and charged niobium samples. Tests indicate that the SANS technique is applicable for studying gases in metals with the advantage over transmission electron and scanning electron microscopy techniques of using thick (2-3 cm) samples. (8340/8440)

- A velocity interferometer system known as ORVIS (Optically Recorded Velocity Interferometer System), which uses an ultra-high-speed streak camera, has been developed to measure surface velocity changes in shock wave experiments with a time resolution of 300 trillionths of a second, a tenfold improvement over previous systems. It has been used to measure properties of a high explosive (TNT) detonation wave, which had been previously unmeasurable. This information has provided justification for the usefulness of a theoretical model developed over 40 years ago. (2510/1130)

- A facility designed for studying

the surface chemical properties of explosive and pyrotechnic materials of interest to the DOE complex has been established. Using x-ray-excited Auger electron spectroscopy and x-ray photoelectron spectroscopy, we have found a correlation between the performance of pyrotechnics and their surface chemistry. In addition, we have obtained the first experimental data supporting the theory that the initiation sensitivity of aromatic explosives is controlled by the relative stability of the aromatic ring system that is uniquely characterized in Auger transitions of these materials. (2510)

- To describe shock wave propagation in aqueous foams, we developed a two-component, three-phase mathematical model for an air/water mixture. In conjunction with the equations governing fluid motion, this model was used to make predictive calculations of the pressure and impulse of an explosively driven wave. These analyses, together with an experimental program, led to identifying an optimum foam density for maximum reduction in damage from an explosive source. (1510)

- A system for computer-assisted on-line solution of electron diffraction patterns obtained with the transmission electron microscope has been jointly developed by Sandia and Rocky Flats. The system permits a reduction (by a factor of 10 to 50) in the time required for indexing of most

patterns; it also enables the solution of previously intractable superimposed patterns from complex samples containing multiple phases and/or crystallographic orientations. This technology has been transferred to several other DOE labs and should be available on future commercial instruments. Received a DOE Award of Excellence. (1820)

- We designed, developed, and fielded two unique instrumentation systems used by the Instrumented Seabed Penetrator Program. Two penetrators were tested in the Mississippi delta region. ISP-1, which penetrated approximately 90 feet, contained an on-board microprocessor-based system that computed depth of penetration from deceleration data and issued pulse-space-coded explosive discretures. The data were recorded by hydrophone. ISP-2 penetrated approximately 125 feet; it contained an on-board digital memory in which deceleration data were stored. The package was recovered and the memory interrogated after the shot. (7580)

- Analytical methods adapted from a reentry body problem were used to investigate the devastating blast of May 18, 1980, at the Mount St. Helens volcano. Calculations demonstrated that sudden unroofing of a vapor-bearing magmatic intrusion within the volcano could cause such a blast and that the required amount of magmatic water is much less than previously supposed. (1510/1540)

## Reimbursables

- A prototype Weapon Storage Vault (WSV) designed to improve the physical security and survivability of stored nuclear weapons has been installed for Air Force evaluation at an air base in Europe. In a development test, the WSV successfully protected weapons from a high explosive detonation. (9220)

- Production of the thermal flash-blindness protective goggles for the Strategic Air Command (SAC) has been completed. A new lightweight version, called the EDU, for fighter aircraft and tanker boom operators is under development. This goggle has been successfully tested in F4 and F15 fighter aircraft. Based on the flight tests of the EDU in several U.S. Army helicopters, a second development program has been initiated for the U.S. Army's Aviation Research and Development Command (AVRADCOM). A third development effort resulting from continuing advances of six-inch diameter devices is a program to provide protective windows for the new B-1B aircraft. (2520)

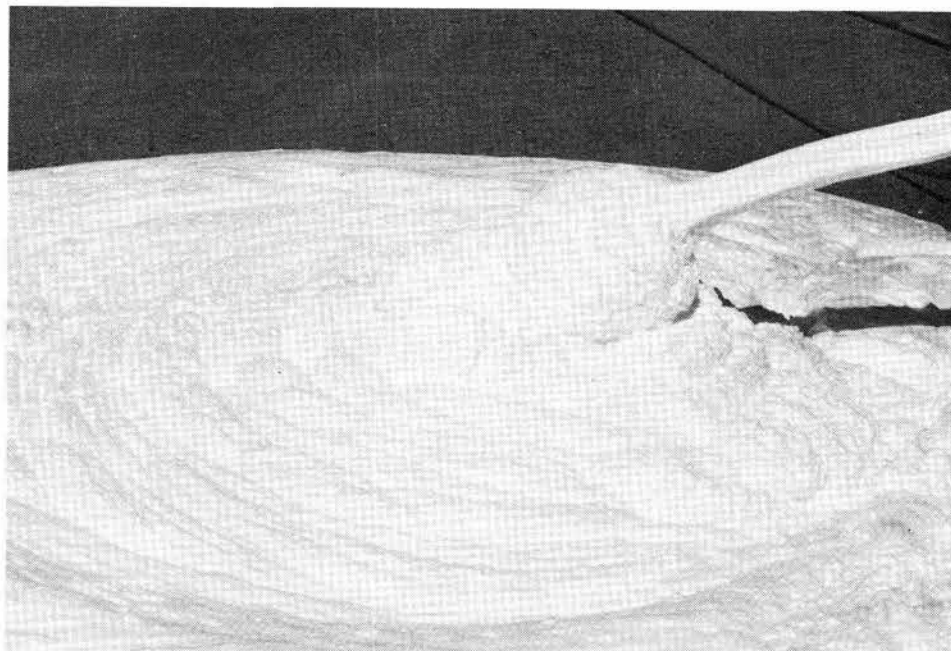
- We have conducted extensive lightning tests on the U.S. Navy F-14/A and F/A-18 aircraft using the Sandia Lightning Simulator. These tests represent the most severe conditions ever imposed for testing full-size aircraft. (7550)

- A launching technique has been developed for evaluating anti-armor and runway penetrator submunitions. These devices are usually deployed in clusters from aircraft or missiles. Thus, the conventional delivery mode is impractical for testing individual submunitions. Small, inexpensive rocket boosters launch submunitions into flight conditions equivalent to conventional deployments for submunition component and system development testing. (7530)

- The next planetary exploration mission undertaken by the Jet Propulsion Laboratory in Pasadena will be to Jupiter in the late 1980s. The mission, known as Project Galileo, will take photos and gather scientific data as the spacecraft orbits and drops a probe into Jupiter's atmosphere. Sandia's CRM (Center for Radiation-Hardened Microelectronics) has supplied most of the radiation-hardened devices for the Galileo spacecraft's central computer, attitude control, and science instruments. (2120)

- A methodology for use in assessing the performance of radioactive waste repositories located in deep geologic formations was completed for the US Nuclear Regulatory Commission (NRC) in 1982. This methodology consists of 1) procedures for selecting and screening potentially disruptive events and processes, 2) computer models for use in simulating the physical processes associated with the geologic disposal of radioactive wastes, and 3) probabilistic and statistical techniques for use in sensitivity and risk analyses. Use of the methodology has been demonstrated on a hypothetical site, containing a bedded salt formation as the host medium for the waste. The methodology has been used by NRC in the development of regulatory standards and the characterization of potential disposal sites. (9410)

- We have made significant progress in determining the threat to commercial nuclear plants posed by hydrogen combustion and in evaluating proposed methods of mitigating such combustion. Our computer code, HECTR, developed to calculate pressure and temperature transients caused by hydrogen combustion in multicompartiment buildings, has become an important analytical tool to



AQUEOUS FOAMS have been found to have unusual capabilities in mitigating blast pressures and impulses and the residual gas pressures that result from high explosive detonations.

examine specific nuclear plants. Cooperative research with McGill University has produced unexpected new results on deflagration-to-detonation transition, detonability limits, and detonation cell size. Our hydrogen program now consists of many analytical and experimental facets. We have also hosted a second international workshop and produced a hydrogen manual for nuclear plants. (9440)

- Recent rapid increases in the use of probabilistic risk assessment (PRA) methods in the nuclear power industry have created a shortage of qualified people at the Nuclear Regulatory Commission (NRC) to monitor, review, evaluate, and perform PRA-related studies. A PRA training program for NRC staff is being developed by Sandia to present a curriculum of 13 technical courses on all phases of PRA related to commercial nuclear power. Some of the subjects

covered are systems analysis, accident phenomenology, consequence analysis, and basic techniques applied to PRA such as probability and statistics, human reliability, data development, and event tree/fault tree methods. Approximately 50 instructors from Sandia and consulting firms are in the process of developing materials, presenting classes at NRC, and documenting notes to establish a long-range PRA curriculum. (9410)

- We have developed a portable radar with a built-in radio link to a hand-held alarm display. This system will be used by the Air Force to detect the approach of unauthorized persons to parked aircraft containing high-value or other sensitive cargo. The system can be carried on the aircraft and, upon landing, can be placed around aircraft and quickly put into operation by a relatively unskilled person. (9230)



# Antojitos

Look, Martha, They Mentioned Our Program--Only the most devoted LAB NEWS reader is likely to read in one sitting every word of each of the 100 Technical Accomplishments capsules in this issue. Read too many at once and the mind boggles. (Shortly after, so do the eyes; that's because the capsules are printed, for reasons of space conservation, in nine-point rather than our usual 10-point text type.)

Why, then, do we ask each of the five technical vice-presidencies to make the effort to cull from the hundreds of contenders 20 or so that are significant enough to be included? For one thing, recognition, of course. It's nice to know that your vice-president believes that what you did last year deserves a bit of special attention (but it's simply not good form, old stick, to scan the columns searching only for items with your department number). For another thing, it's the only time that all of our major accomplishments for a year appear in one convenient, user-friendly package. More important is the fact that this issue goes, as do all issues, to some 5000 readers who are not Labs employees. It's the best possible answer to the question some of them must hear often--"Sandia Labs, huh. What do they do?"

Just as important, this issue gives us all, non-technical as well as technical people, the opportunity to feel good about what we, collectively, have done in the past year. So, if the reader's mind boggles, maybe it's simply because many of these accomplishments are mind-boggling. That's what we're paid to do--we do it.

●BH

"We act as though comfort and luxury were the chief requirements of life, when all that we need to make us really happy is something to be enthusiastic about." --Charles Kingsley

## Events Calendar

- Jan. 21 — Old Time Concert & Dance with John McCutcheon singing and playing the hammered dulcimer, fiddle, and hambone, etc., 8 p.m., KiMo.
- Jan. 22 — Ruben and Vicente Romero in an evening of Spanish dance and classical guitar, 8 p.m., KiMo.
- Jan. 22-23 — San Ildefonso Pueblo annual Feast Day: vespers, procession in faralito-lit plaza on the 22nd, daybreak animal dances in all four plazas, all afternoon buffalo, Comanche, and deer dances on 23rd. Contact Pueblo.
- Jan. 22-23 — Albuquerque Children's Theater presents Pinocchio, 1:30 & 3:30 p.m., Popejoy, 277-3121.
- Jan. 28-29 — Albuquerque Opera Theater presents "The Merry Wives of Windsor," 8:15 p.m., KiMo, 243-0591.
- Jan. 29 — Barry Manilow concert, Tingley Coliseum, Giant Tickets, 243-3208.
- Jan. 30 — "The Chieftains," concert of full range of Irish music, 8:15 p.m., Popejoy.
- Feb. 3 — The Big Band Cavalcade, 8:15 p.m., Popejoy.
- Feb. 3-5 — Springtimespace '83, a dance concert of new works choreographed by UNM dance faculty, 8 p.m., Rodey Theater, UNM.
- Feb. 4-5 — "The Red Poppy," a post-revolutionary Russian ballet performed by the NM Ballet Company, 8:15 p.m., Popejoy.

## Death

Paul Balwahn of IC Technology and Photo-voltaics Engineering Division 2146 died Jan. 11 after a short illness. He was 26.

He had worked at the Labs since May 1976.

Survivors include his widow and two sons. Contributions may be made to the Paul Balwahn Memorial Fund, in care of David Sanders (2144).



## Legal Notices

The following legal notices are required by court orders to be published in two consecutive issues of the Sandia LAB NEWS.

### IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF NEW MEXICO

EDWARD C. NEIDEL, JR., WILLIAM B. MINSER and CORA S. CALLENDAR, individually and as class representatives,

Plaintiffs,

vs. No. CIV 81-0616 HB

SANDIA CORPORATION, a corporation, and PRUDENTIAL INSURANCE COMPANY OF AMERICA, a corporation, individually and as trustees,

Defendants.

### NOTICE

To all Sandia employees, retirees and former employees:

YOU ARE HEREBY NOTIFIED that two putative class action lawsuits, *Neidel, et al. and Olheiser, et al. v. Sandia Corporation, et al.*, Nos. CIV 81-0616 HB and CIV 81-0617 JB are pending in the U.S. District Court for the District of New Mexico. The relief requested is the return of mandatory employee contributions to Sandia's retirement plan and to require Sandia to make additional contributions to the retirement plan based upon alleged breach of contract, fraud and wrongful conversion. These actions have never been certified as class actions by the Court.

The parties have agreed that these actions will be voluntarily dismissed without prejudice by an order of the Court on or after February 4, 1983.

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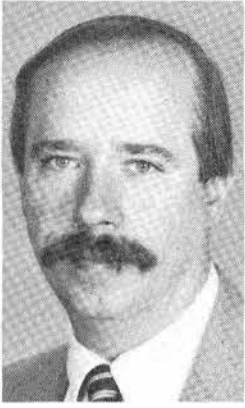
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Member, International  
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## Supervisory Appointment



KEN WILSON to supervisor of Physical Research Division 8347, effective Jan. 1.

Ken joined Sandia at Livermore in 1974 in the Physical Research Division. He has worked on hydrogen and helium effects in solids, ion-solid interactions, and plasma wall interactions in magnetically confined fusion energy devices.

His education includes a bachelor's, master's and PhD from Cornell University, all in materials science.

Ken's main pastime is bicycling. He and his wife Sharon and two-year-old daughter live in Livermore.

## Take Note

Jeff Manchester (8216) has taken over the responsibilities of retirement counseling and retiree assistance from Jim Henderson who has transferred to the Financial Division 8213. Jeff's phone number is 2-2131. He has been at Livermore since June 1982 coordinating the alcoholism program and the Sickness Absence Management Plan, which he will continue to handle.

## Retiring



Gerry Nerton - 8336-1



John Brengle - 8466



Jim Harter - 8254



# SANDIA LIVERMORE NEWS

VOL. 35 NO. 2

SANDIA NATIONAL LABORATORIES

JANUARY 21, 1983



RICK BLUM (8271) demonstrates his form in the squat lift with 600-pound weight. The spotter behind him is a safety precaution in case the lifter has difficulty in lowering the weight.

### This Is Really Heavy

## Weightlifter Strains Toward Success

If you have a flat tire after work and need someone to lift the back end of your car while you remove the wheel, one Sandian would be a likely candidate for the job — Rick Blum of Design Definition Division 8271.

Rick recently won the mid-state competition at San Luis Obispo in powerlifting with three lifts totaling 1317 pounds. The weightlifting sport includes three types of lifts at each meet — the squat, in which the bar rests on the shoulders and the contestant does a deep-knee bend under the weights; the bench press, in which the lifter lies supine on the bench and pushes the barbells vertically upward; and the deadlift, in which a person reaches down, grabs the bar, and stands erect with the weight at his side.

Powerlifting is one of three weightlifting sports in America. The other two are Olympic-style weightlifting, which includes raising the barbells over the head, and bodybuilding, which is developing one's physique for exhibition purposes.

Capturing the mid-state title at the 165-pound weight class has prompted Rick to move up into the next weight class — 181 pounds — and begin training for what he hopes will be the championship in his home state of New York and, eventually, junior national title competition. He is aiming at the New York title by March of 1984, and realizes that he will have to work up to lifting a combined total of more than 1700 pounds to win.

Currently, Rick's squat lift is ranked 38th in the nation. However, by 1984 he wants to break both the New York and Cali-

fornia records, at 660 and 705 respectively, which would then rank him in the top five.

Rick was a latecomer in weightlifting, not getting into the sport until he was in the Marine Corps in 1977. He entered his first competition for the Marines in January 1980 while at Camp Lejeune, N.C. After five years in the military he returned to civilian life and went back to college at Buffalo, N.Y., where he earned a mechanical technology degree before coming to Sandia last June. While in college he competed under the auspices of the U.S. Powerlifting Federation. He has lifted in the 148-, 165-, and now the 181-pound class, which is considered light-heavyweight.

He must follow a strict training regimen and a high-protein diet. "I can't enjoy the luxury of doughnuts," says Rick. "I must stay within the bounds of competition weight, maybe going up to 186 during training." He eats five times a day, concentrating on red meats, chicken, turkey, and fish plus a sizable dosage of supplemental vitamins and minerals.

Working out at a Hayward gym four times a week, Rick practices deadlifting once a week and the bench press and squat twice weekly. For the first time he has found a sponsor, a Hayward chiropractor who helps with training and travel expenses. Since powerlifting is an amateur sport, there are no monetary awards at contests, only trophies.

Why does he like the sport and keep at it so intensely? "You go into it for the competitive spirit and self satisfaction," says Rick. "I am self taught and develop my own techniques. There is no old man in a Himalayan temple giving out the secret of getting to the top. The secret to winning is wanting to win and going out to learn how to do it." Rick spends other free time reading and researching the sport or visiting other workout centers in California where he talks with lifters to gain insight into powerlifting.

### Sympathy

To Alice Rogers (8122) on the death of her mother in Modesto, Dec. 6.

## Take Note

Peripatetic Sandians Mina (1633) and Don (2545) Carnicom will present a slide show based on their travels to the Galapagos Islands and Kenya. Sponsored by the Audobon Society and Popejoy's Travel-Adventure Series, and open to the public (\$3.50; \$3 for students and seniors), the show is at 7:30 on Jan. 29 at Popejoy.

\* \* \*

School board member John Cantwell (3163) calls the Feb. 1 school bond election a crucial one for APS. Several improvements in science teaching facilities, as well as capital improvement projects and a board election, are included. If you're part of the APS district, please become acquainted with the issues and vote Feb. 1.

\* \* \*

Weight. You lose some, you gain some. If that sounds familiar — or if you're one of those who managed to maintain after you lost weight — Janeanne Snow (wife of Gary in 2527) would love to hear from you. She's in graduate school at UNM, and she's heading a research project designed to learn the differences between weight regainers and weight maintainers. If you're one of the two and willing to fill out a questionnaire, call her on 292-8832 right away.

\* \* \*

A group of Atrisco land grant heirs is being formed to get acquainted and exchange information of interest. If you are an heir, it is your right and duty to register your concerns. Please contact Bertie Denman (2613) at 296-6851 or Phil Tafoya (SAO) at 821-3187 for more info.

\* \* \*

Anthony Muller of Fuel Cycle Risk Analysis Division 9413 is taking a two-year leave of absence to join the Nuclear Energy Agency of OECD (Organization for Economic Cooperation and Development). He will be an administrator for projects in geochemical, high and low level wastes, and uranium mill tailings. OECD is a Paris-based international organization with 17 member countries. Anthony earned his doctorate in engineering, environmental isotope hydrology, in 1977 from the Université de Pierre et Marie Curie (Paris VI).

\* \* \*

Wanted: an engineer or two to design a system of head support that would permit a severely handicapped three-year-old girl to breathe easily. She has hydrocephalus (enlarged head) as well as spina bifida, so it's a real technical challenge. Cindy Wilson at 266-8201 can supply inspiration and information.

\* \* \*

A general meeting of the New Mexico Zoological Society will be held Wednesday, Jan. 26, at 7:30 p.m. at St. Timothy's Lutheran Church, 211 Jefferson, NE. Ingrid Schmidt, General Curator at the Rio Grande Zoo, will present a slide show, "The Land Down Under." The public is invited.

\* \* \*

KAFB employee Paul Regusis is teaching an evening course at UNM in Basic Graphic design for 10 weeks. The class meets Tuesdays and Thursdays from 6:30 to 8:30 starting Feb. 15. For course info, call



NEW SUPERVISORS: Sam Myers (112) and David Hasti (1245)

## Supervisory Appointments

**SAM MYERS** to supervisor of Ion Implantation Physics Division 1112, effective Jan. 1.

Sam came to the Labs in 1970 on a Sandia post-doctoral appointment. He was assigned to a research department for two years, where he used nuclear magnetic resonance to investigate magnetism in materials. At the end of his appointment, he joined Sandia as a staff member in the Ion-Solid Interactions Division 1111, where his primary work has been in the use of ion beams to investigate metals.

Sam received a BS and PhD, both in physics, from Duke University. He is a member of the American Physical Society, the Metallurgical Society of AIME, and the Materials Research Society. He enjoys hiking, skiing, photography, and amateur astronomy. Sam lives in the NE heights.

**DAVID HASTI** to supervisor of Pulsed Power Development Division 1245, effective Jan. 1.

He has been with his current division since coming to Sandia in January 1980. His most recent work has been on the mega-amp accelerator and beam experiment (MABE) — the technology test bed for Hermes III. Before coming to the Labs, Dave was with the Austin (Texas) Research Associates, working with pulsed power and accelerators.

Dave received his BS in physics from the University of Florida, his MS in aerospace engineering from the University of Virginia, and his PhD in physics from the University of Texas (Austin). He enjoys skiing, sailing, motorcycling and hiking. Dave and his wife Michelle live in Sandia Heights.

Paul evenings at 836-0319; for enrollment info, call UNM at 277-3751.

\* \* \*

The non-profit L'Ecole de Alliance Française begins a new series of classes Jan. 31. In addition to conversational French, both business French and "La Cuisine Française" are offered this term. Tuition is \$48 for 12 weeks. More info from Margery Storrs at 821-5788.

\* \* \*

"The Beginning Experience," a program designed to help widowed, separated, and divorced people make a new beginning, will be held for an entire weekend (8 p.m. Jan. 28 through 4:30 p.m. Jan. 30) at Harwood School. It's \$45, and deadline is Jan. 22. Call Fabian Gagnon at 867-2954 or Marilyn Hart at 821-3604 for more info.

\* \* \*

The New Year's baby at Las Vegas, Nev., this year, born at 12:01 a.m. Jan. 1, is Michael Bryan Geene, son of David (7171) and Francine Geene. He weighed in at 7 lbs., 13 oz. Las Vegas showered the infant with gifts while David passed out cigars to co-workers at Tonopah Test Range.

\* \* \*

"Talking to Your Young Child About Sex" is the topic of the next program in Medical's Go for Health series. Stephanie Farrow and June Lecrone, staff members of the local Parentcraft, Inc. agency, will share the spotlight on Jan. 25 from 12-12:30 in Bldg. 815. Parentcraft is a non-profit agency offering information and support to young families. Information about a variety of programs sponsored by Parentcraft will be presented. Their programs include: a warm-line counseling service, workshops on parenting and family issues, support groups for first-time parents, mother's drop-in centers, and a grand-family program.

\* \* \*

Medical will be scheduling classes in basic CPR (cardiopulmonary resuscitation) in the near future. If you would like to be trained in CPR, please call Wanda Cupp (3332), 4-7169.

\* \* \*

Retiring this month and not shown in LAB NEWS photos are Alice Brinkley (2100), Luciano Chavez (3418), Harry Pastorius (3000), Pablo Garcia (3618), Jim Davis (9225), Lillian Balfour (3141), and Ann McIntyre (1636).

## Fun & Games

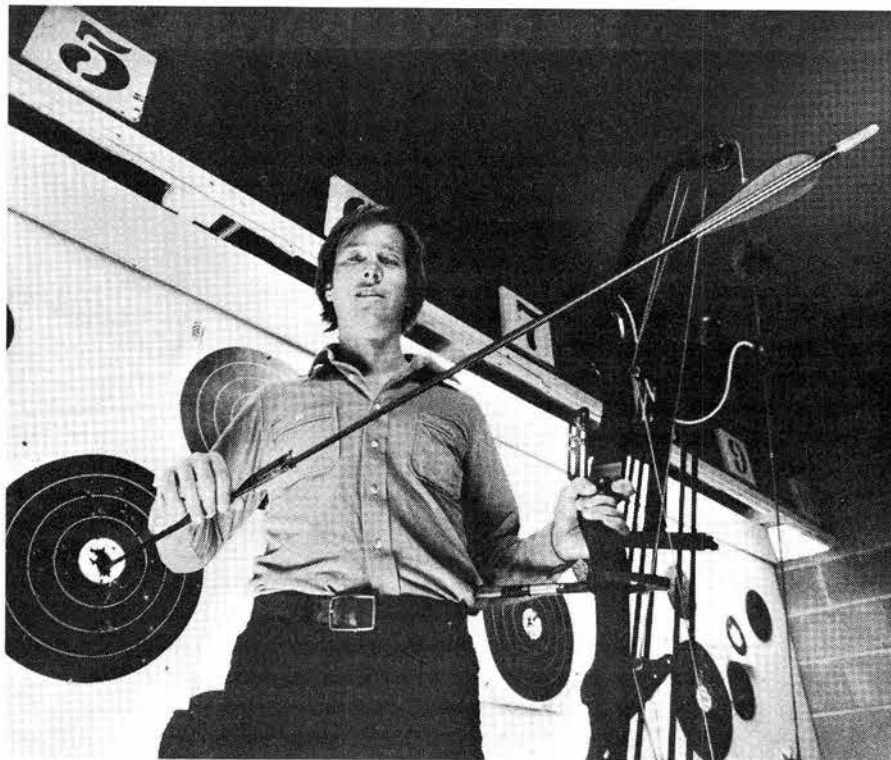
**Hunting** — David Krukar (2342) was one of 70 lucky winners in a recent drawing for an ibex hunting license, and he bagged a beauty — about 130 lbs. field dressed with a 41½-inch horn spread. The exotic animal was part of a herd imported several years ago by the New Mexico Department of Game and Fish and now prospering in the Florida Mountains south of Deming. That's where David located his after a day of hunting. It took a day and a half to get it out, overcoming obstacles like lowering it 800 yards down the steep side of a canyon.

\* \* \*

**Biking** — The 11th Annual Tour of the Rio Grande Valley, a 100-mile bike ride from Albuquerque to Belen and back, begins at 6:30 a.m. on April 17. (There's also a 50-mile loop for the less perspiration-oriented.) Registration is limited to 1000 people or April 3, whichever arrives first. Sponsored by the New Mexico Wheelmen, the Tour costs \$6; that includes a patch, drinks and snacks, a T-shirt, and friendly sag wagon services. Info and registration forms are available in the LAB NEWS office. Walt Joseph (9343) at 4-2455 is available for Tour consultation.

\* \* \*

**Plucking** — An evening guitar class is offered through SERP (Sandia Employee Recreation Program) starting Jan. 31. The class, a survey of country, blues, bluegrass, folk, and classical styles, meets eight consecutive Mondays from 7 to 8:30 in Room B5 of the Coronado Club. Cost is \$30. So pull that old six-string out of the closet and push the buttons to call Tom Lenz, Recreation Manager, at 4-8486 for signup.



A "ROBIN HOOD" to an archer means one arrow already shot into the bulls-eye ring is impaled dead center in its shaft by a second arrow. The event is as rare as a hole-in-one to a golfer. Steve Slutz (1265) has shot two Robin Hoods in the past two months, and he started shooting seriously only three months ago. He is a member of the Archery League at the Albuquerque Shooting Academy. He uses a compound bow with a peak 61 lbs. of pull. He likes hollow aluminum arrows, and a Robin Hood costs him \$6 each in ruined arrows. Steve figures his particular odds of shooting a Robin Hood are 5000 to one.

## Credit Union Annual Meeting Set Jan. 27

The 35th annual meeting of the Sandia Laboratory Federal Credit Union will be held Thursday, Jan. 27, at 5:15 p.m. in the Coronado Club ballroom. Following the regular business meeting, refreshments will be served and drawings made for cash prizes. First prize is \$500, second is \$300, and third is \$200. All individuals who were members of the Credit Union on Dec. 31, 1982, and who still have an account on the annual meeting date are eligible for the prize drawings. You do not have to be present to win.

### Happier New Year

We're off and running at the start of another new year, but it's still not too late to follow up on those New Year's resolutions. For a healthy and happy new year, join Medical's next quit-smoking class Feb. 9 through March 7 (on Mondays and Wednesdays) from noon to 1 p.m. in the conference room of T-13, Rm. 1. For signup, contact Arlene Price in the Medical Department at 6-0021.

### Sympathy

To Robert Byrd (3435) on the death of his brother in Kansas City, Kans., Dec. 30.

To Irv Lenz (7556) on the death of his father-in-law in Albuquerque, Jan. 12.

## Retiring



Don Fossum (3522)



Joan Gillon (3400)



John Lyle (7535)



Jim Taggart (9214), Bruce Langford (7474), and Bill Boyes (7221).



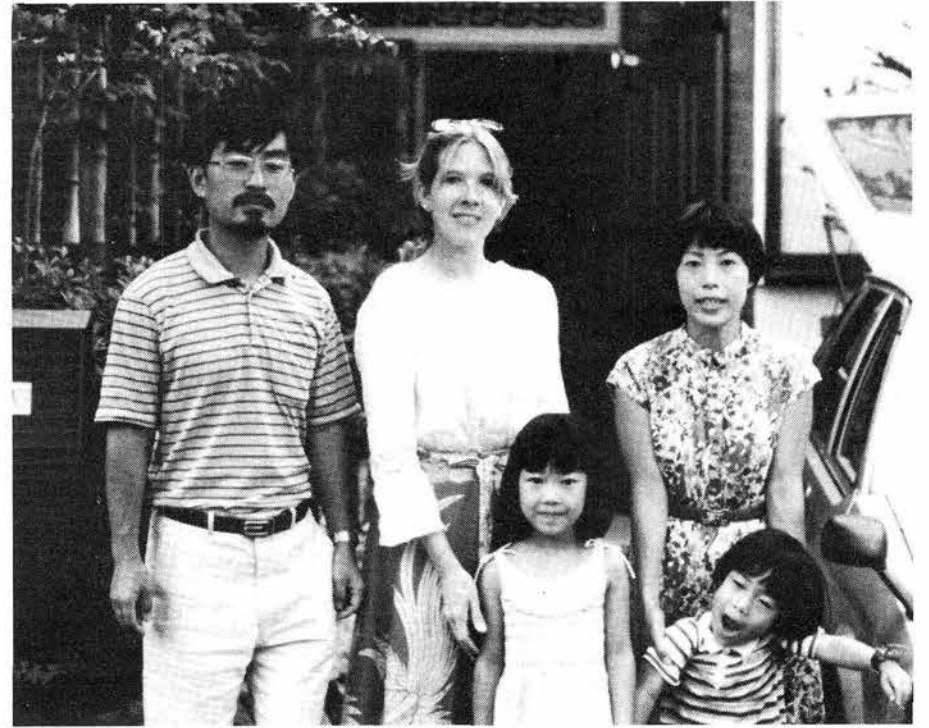
Audrey Burns (3417), Chuck Sullivan (1124), Bob Tant (7482), and Frank Anderson (2551).



Floyd Norcott (9325), Paul Narrah (7482), Armstead Arrington (3618), and Daniel Alvino (2457).



ANCIENT temple in Kyong-ju, capital of Korea during the Silla Dynasty. From the 7th through the 9th centuries, Silla kings unified the peninsula for the first time in history.



CAROL and her host family in Japan. Ryo Matsumoto is a sedimentology professor at Toyko University. His wife Takako attempts to restrain son Yohei while daughter Junko poses prettily.

### Unusual Vacation

# Japan and Korea by Train, Bus, and Thumb

When we last saw Carol Stein (9731), it was mid-August. She had just disembarked at Hakodate, Japan, from the research vessel *Glomar Challenger*, after two months at sea in the northwestern Pacific (LAB NEWS, Oct. 29, 1982).

"After a few days of re-equilibration in Hakodate, I flew to Tokyo and then took the 'Bullet Train' to Kyoto, Japan's ancient capital," says Carol. "I spent a couple of days taking in many of the fabulous old Buddhist temples and Shinto shrines. In the process, I met a number of incredibly friendly and helpful people. My Berlitz phrase book actually allowed me to communicate reasonably well.

"I reboarded the train to go on to Hiroshima and then to Shimonoseki, at the southernmost end of the island of Honshu. The train travels about 120 mph — a very smooth ride, but not an inexpensive way to travel.

"From Shimonoseki I took an overnight ferry to Pusan, South Korea. It was very crowded — there must have been 400 people on board, mostly Koreans. We were issued blankets — if you were lucky enough to grab one — and we slept on the floor. Many of the other passengers built fires in little hibachis and cooked on them, crowded as it was, or just smoked and talked all night. Not too conducive to a lot of sleep, but fun."

Carol met other foreigners on the Korea-bound ferry: an Australian woman who taught yoga in Tokyo and two young men from California. Most Americans her age that Carol encountered seemed to be just drifting around somewhat aimlessly, she says, mainly teaching English and looking for other ways to survive in the Orient.

"From Pusan I hitched a ride on a Korean army truck with some soldiers who spoke a little English," she continues. "They told me that hitchhiking was reasonably safe but somewhat unusual. On that recommendation, I decided to try it. In

general, I rarely had trouble getting a ride — the real problem was in making the driver understand where I wanted to go."

"Traveling in Korea is incredibly cheap. One can go from Pusan to Seoul, about 200 miles, for about \$15. The trains I rode were old, slow, and not too comfortable, but I couldn't have chosen a better way to see the country and meet people. Korea, unlike Japan, is very rural — many rice fields, orchards, and vineyards. I loved traveling through the little farming villages."

Traveling up east-central Korea, Carol stopped at Kyong-ju, the ancient capital of the Silla Dynasty (A.D. 688-892). For a small admission fee, one can visit the Silla temples, palaces, and tombs that are situated among well-maintained gardens. She continued on to the village of Sak-cho, near Mt. Sorak National Park, in the northeastern corner of South Korea, near the demilitarized zone. She spent a couple of days hiking in the park, in spite of the frequent rain. The park has good tourist facilities, including campgrounds and a youth hostel.

"I arrived in Sak-cho around 11 p.m. on a bus," says Carol. "A young man, who turned out to be the village dentist, offered to help me find a room. Since all the hotels were filled, he insisted on taking me to his home where he lived with his mother and sister. In the morning, his mother called me to breakfast, which consisted of about 25 little dishes — including raw and cooked squid, eggs, rice, fish, soup, tea, and the ever-present kimchi, a dish of fermented cabbage and hot red peppers that's served at virtually every meal. What a way to start off the day! Raw squid first thing in the morning also took a bit of getting used to, although dipped in something approximating chili sauce, it wasn't too bad.

"This generosity to a stranger was fairly typical. I thought that the Japanese were friendly, but Koreans were positively over-

whelming. On the trains, other passengers occasionally bought me food and drinks from the snack carts, then sat down to practice their English. A couple of times, on leaving a bus, the driver told me my ticket had been paid for. It was impossible to ask anyone for directions without having half a dozen other people stop to volunteer their opinions — all different, of course! All in all, it was pretty humbling — especially when one considers how Americans usually respond to foreigners in the U.S."

Carol generally stayed in Korean inns (*yogwan*); for \$8-\$12 a night, the traveler gets a little room with a sliding door, a bed roll, slippers, and a pot of tea. The floor is heated from underneath (the *ondul*), and the bathrooms are western-style but communal. As to food: "I preferred to eat 'on the road,' buying fruits, vegetables, and bread mostly from street vendors — usually little old ladies.

"I finally ended up in Seoul — it's a fairly modern and sophisticated city of almost 8 million people. It has a good bus system, which I had no trouble using, and a subway is being built.

"I was greatly impressed with how militaristic Korea is. Every village has a military post, and soldiers often checked the buses and trains. There's a terrible fear of an invasion from North Korea, and the presence of U.S. forces makes them feel more secure — one reason, I suppose, that Koreans are so friendly to Americans."

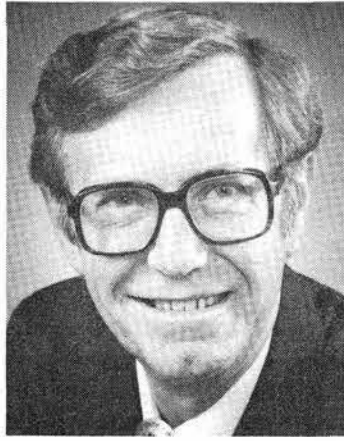
Finally, Carol flew back to Tokyo and stayed with the family of a geologist she met on the *Glomar Challenger*. His wife didn't speak much English, but we hit it off rather well together — even spent a day shopping along the Ginza. They showed me around Tokyo and also took me to Hakone — that's a hot-spring resort area just south of Mt. Fuji — tremendously interesting geology."

Of her travels, especially in Korea, Carol says it was an "incredibly satisfying experience. I've always tried to learn to say a few words in the language of whatever country I'm traveling in — people really seem to appreciate the fact that you're making an effort to communicate."

# MILEPOSTS

## LAB NEWS

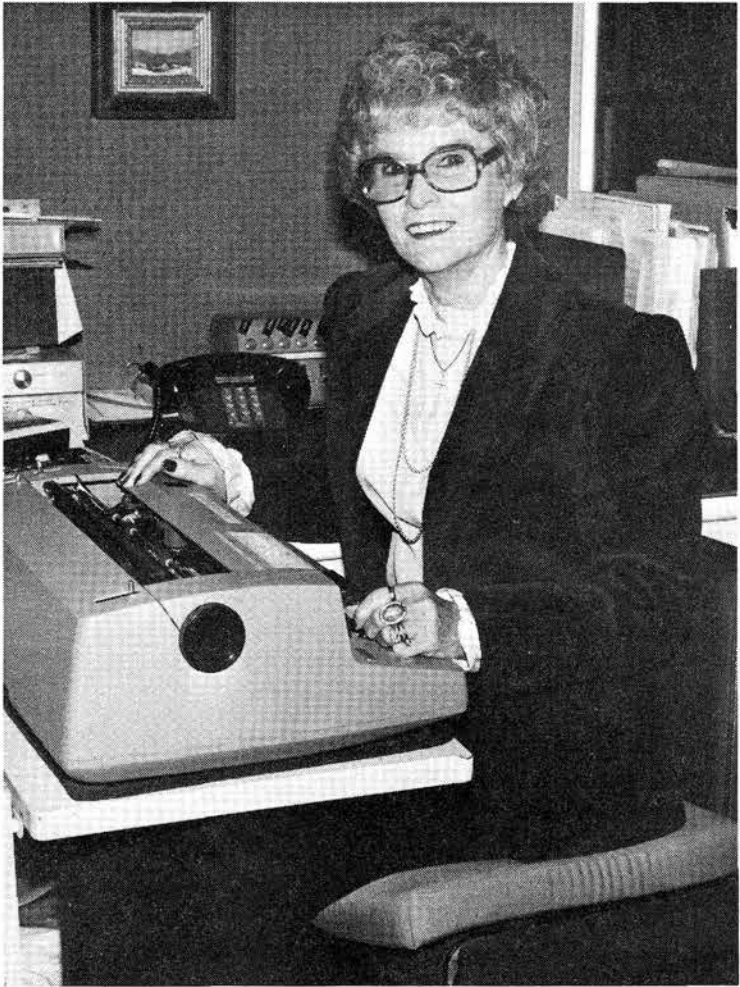
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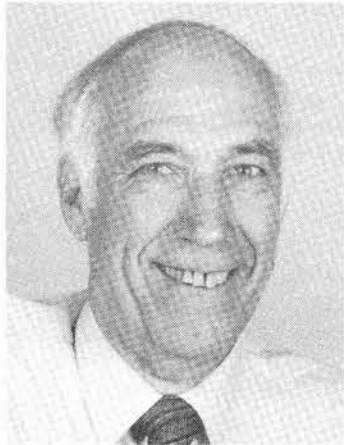
Del Olson - 8100 30



Dean Davis - 9400 25



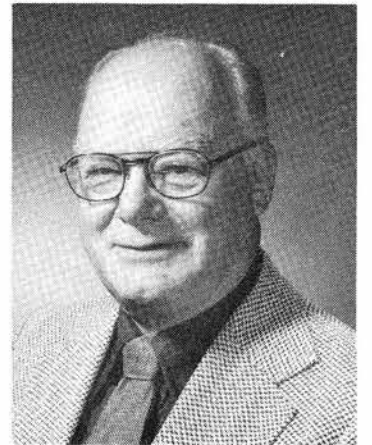
Jackie Gray - 3743 20



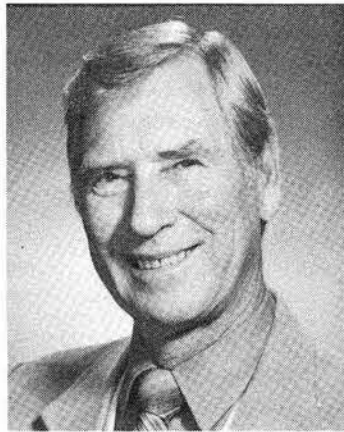
Carleton Scott - 8121 30



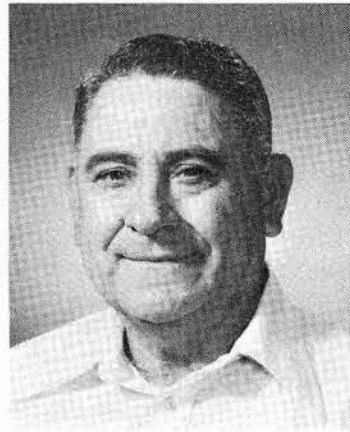
John Weydert - 7133 30



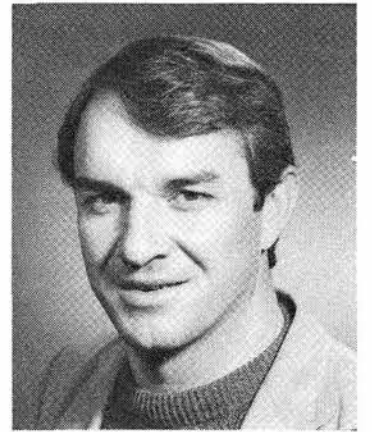
John Lyle - 7535 20



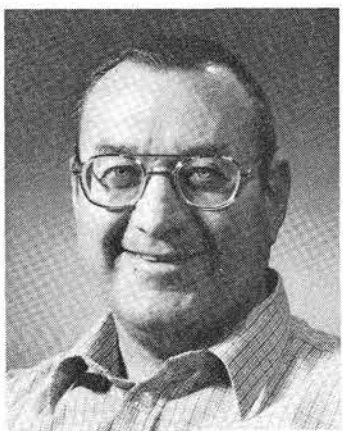
Harry Olson - 2122 30



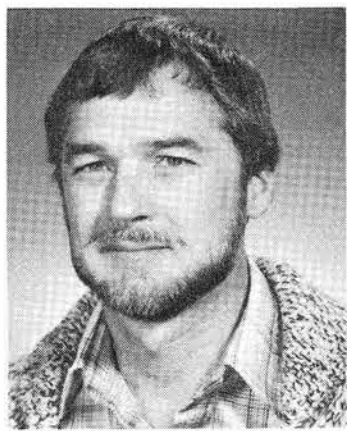
John Lowery - 3426 20



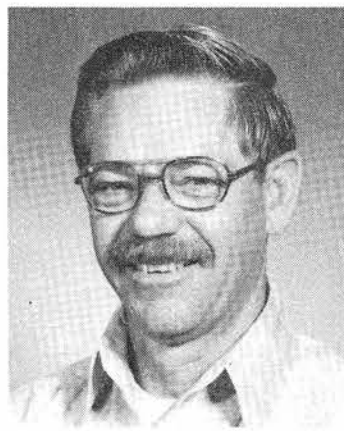
Mike Knotek - 1134 10



Gerald McCoach - 9269 20



Lou Feltz - 0313 20



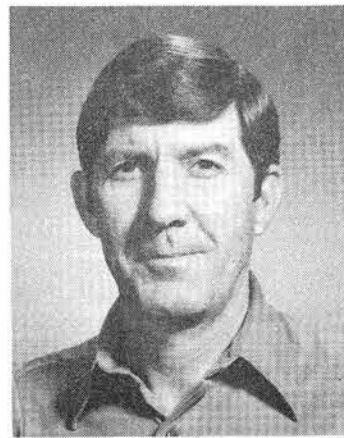
Bob Meyer - 2545 10



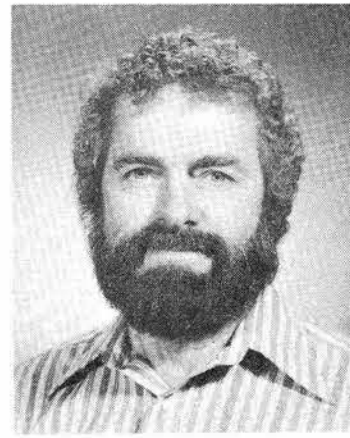
Evelyn Renker - 3743 15



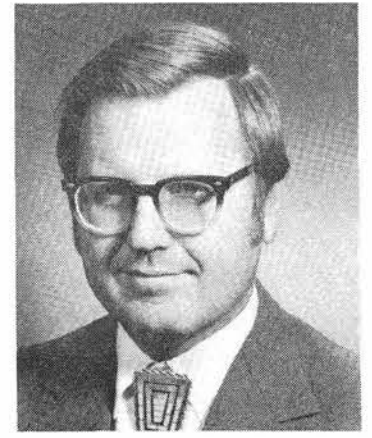
Lewis Fjelseth - 9214 30



Adron Pritchard - 2613 20



Bill Pepper - 1632 30



Laverne Romesberg - 9782 10

# 1983 Holidays

Memorial Day . . . . Monday, May 30  
 Independence Day . Monday, July 4  
 Labor Day . . . . . Monday, Sept. 5  
 Thanksgiving . . . Thursday, Nov. 24  
 Energy Conservation  
 Day . . . . . Friday, Nov. 25  
 Christmas and New Year  
 Shutdown . . . . . Monday, Dec. 26  
 through Monday, Jan. 2

## Congratulations

Henry Strauss (ret.) and Marilyn Bennett (Credit Union) married Jan. 2 on Kauai, Hawaii.

Don (1200) and Cathy Brewer, a daughter, Ryan Leigh, Jan. 8.



U.S. SEN. PETE DOMENICI was featured speaker last week at a "Take Stock in America" luncheon. He was introduced by President Dacey, Albuquerque chairman for the 1983 Savings Bond campaign. At the luncheon, Sen. Domenici discussed the new Savings Bond yield based on 85 percent of the return on five-year Treasury marketable securities. During the first market-based interest period (Nov. 1, 1982, to April 30, 1983), Series EE Savings Bonds purchased during the period will earn 11.09 percent interest when held five years or longer. The luncheon was attended by about 100 community leaders.

## JUNK•GOODIES•TRASH•ANTIQUES•KLUNKERS•CREAM PUFFS•HOUSES•HOVELS•LOST•FOUND•WANTED•& THINGS

### CLASSIFIED ADVERTISING

Deadline: Friday noon prior to week of publication unless changed by holiday. Mail to: Div. 3162 (M0125).

#### RULES

1. Limit 20 words.
2. One ad per issue per category.
3. Submit in writing. No phone-ins.
4. Use home telephone numbers.
5. For active and retired Sandians and DOE employees.
6. No commercial ads, please.
7. No more than two insertions of same ad.
8. Include name & organization.
9. Housing listed here for rent or sale is available for occupancy without regard to race, creed, color, or national origin.

### MISCELLANEOUS

- SANDIA belt buckles, \$8; caps & T-shirts, \$6 ea.; *NM Place Names*, \$5.95; *NM Mountains*, \$6.95; paperbacks, hard covers. South Hwy. 14 Project, LAB NEWS office, MO-125.
- CANDLESTICK telephone, black, touchtone, bought new at Phone Center, 2 mos. old, \$100. Lynn, 293-2485.
- JR. HEAD SKIS, 130cm; Besser bindings; Caber boots, size 7, complete set \$40 firm. Foor, 298-4980.
- FREE-STANDING fireplace, \$25. Mooney, 299-1774.
- AQUARIUM, complete with pump, stand, filter, rocks, \$20; 3 bar stools, \$40 ea.; elec. smoker, \$35. James, 294-6837.
- DYNAMO Foosball table, coin operated, make offer. Dink, 293-0299 after 5.
- ZENITH Chromocolor portable 19" TV, \$200; Kenmore dishwasher, hot & cool dry cycles, 5 wash cycles, \$200. Smith, 299-7151.
- ANTIQUE dry sink kitchen cupboard, oak, all handmade, \$1000. Barr, 293-7542.
- WOMEN'S LOOK ski bindings, brand new, \$40. Arnold, 293-8364 or 822-1307.
- GEMEINHARDT flute, student model, silver plated, with case, \$200. Renschler, 294-2600.
- FORD tires & rims, 5-hole; refrigerator, \$25. Riley, 869-2119.
- BLACK ANGUS bull, \$1200; beef calf, \$650; breeder cows, \$600; wooden trusses, 4 30' for \$40, will trade; fat hens, \$1. Lackey, 898-6638.
- HOSPITAL equipment: bed, wheelchair, walker, portable toilet. Edenburn, 869-2911.
- SPEAKERS, Ultralinear, 3-way, 10" woofer, \$125 pair. Johnston, 299-1830.
- WARDS 2-speed washer & auto. dryer, extra lg. 18 lb capacity, \$60 each. Nordstrom, 296-0619.

- CHAIR, black vinyl covered walnut; 2 headphone AM-FM radios. Eldredge, 881-4528.
- ROYAL typewriter, recently overhauled, \$40; Herter duck decoys, \$20; novelty ball clock, \$15; Craftsman 30" lawn sweeper, \$15. Gregory, 268-2022.
- LADIES fashion cowboy boots, Capzio, brown suede, 7M, worn 2 hrs. Mooney, 299-1774.
- APT. SIZE washer & dryer, \$350. Kaiser, 298-1518 before 2 p.m.
- SOFA, Thomasville, \$250. Adams, 881-6836.
- PIGEONS: Indian Fantails, Chinese Owls, both excellent breeding stock. Tapia, 294-4139 after 5.
- ELEC. washer & dryer, Sears Kenmore, HD, large capacity, all features, almond color, 2 yrs. old, \$500/pair. Muller, 299-1756.
- GARAGE DOOR, 8'x7', metal, \$35. Naranjo, 265-6369.
- ROLL TOP DESK: Victrola; Ski-Doo; furniture & other miscellaneous. Sumner, 255-9376.
- RATTAN hanging chair on metal stand, cushion included; glass table top for 48" round table, 1/2" thick. Burken, 255-8534.
- NORGE clothes washer, \$50; dryer, \$150. Pierson, 884-3174.
- TOASTER, 2-slice, \$5; single-element electric range, \$5; ladies down-filled vest, \$5. Robinson, 255-0114.
- TWO red velvet fireside chairs, \$125 each or both for \$200. Botner, 298-6007 after 5.
- GM infant love seat (up to 20 lbs.), \$30; Gerry kiddie pack with stand, \$12; summer maternity clothes, size 10. Newcom, 293-5180.
- MAHOGANY CHEST & mirror, 12 drawers, curved front. Gallegos, 294-3790.
- 53" ROUND cherry wood table & 6 chairs, antique, \$400. MacPherson, 293-1090.
- COLEMAN air compressor for 12 volt operation, use on inflatable toys or tires & mattresses, \$20. Henry, 266-6467.
- LARGE window glass, 2'x8', 2 pieces single with reflective film, 1 double (thermal) pane. Gerstle, 298-7854.
- TRAVEL TRAILER, 19 1/2', self contained, tandem wheels, dual refrig., furnace, dual gas tanks, \$2750. Luikens, 881-1382.
- COFFEE TABLE, Lane, contemporary style, walnut, includes shelf & 2 enclosed storage areas, \$60. Carne, 296-4219.
- OFFICE DESK, 3'x6', wood, 5 drawers including file drawer, \$150. Stackpole, 821-5348.
- BAR STOOLS, 4 each, 30", brown velvet with oak. Conant, 884-8546.
- FREEZER, Kenmore, almond model #22098, 9 cu. ft., has lock, purchased new 3/15/82, used 3 months. Saavedra, 266-6997.

- MATTRESS & SPRINGS; bar & 4 stools; miscellaneous items, best offer. Widner, 294-2014.
- STEREO console, 72" long, AM-FM turntable (needs switch), dark wood cabinet with storage, \$125. Hole, 255-1444.
- EX. STYLE wood desk, large surface, \$500; 9-piece maple dining set, \$440; other furniture. Price, 821-0342.
- 150 POUNDS of free back issues, 1971-79 *Radio Control Modeler*, *Popular Electronics*, etc. Horine, 266-4534.
- MATTRESS & box springs, full size, twin mattress; classroom chair/desk; baby stroller; washer/dryer stack stand. Berman, 296-5640.
- 3 KITCHEN RANGES: 1 gas, 2 electric; 2 bowling balls; 670-15 tire chains; Ironrite ironer; reg. headboard. Mills, 299-2130.
- SEARS air compressor without motor, \$25; Craftsman bleeder type paint spray gun, \$15; motor, 1/4 horsepower, \$25; tank, \$25. Allen, 296-6453.
- PORTABLE dishwasher, hot water heater, both Sears. McKeever, 299-2777.
- CAMPER SHELL, fits long wide bed, 34" high, fully insulated, with extras, \$250. Miller, 869-6383.
- TYPEWRITER, portable, manual, "Webster" by Brother, \$35. Chorley, 296-1454.
- CAR SEAT, GM Infant, usable to 40 pounds, \$20; crib mattress, Kantwet deluxe model, \$15. Stephenson, 296-9330.
- COMPOUND BOW, Bear, Polar 45-65 lb., Bear quiver, aluminum arrows, vinyl case & accessories, \$125. Luna, 293-4674 after 5.

### TRANSPORTATION

- '79 MERCURY Zephyr Z7 sports coupe, 2-door, bucket seats, moonroof, AC, 4-speed, \$3000. or best offer. Hymes, 821-3255.
- '73 HONDA SL100 motorcycle, trail or street, includes manual & extra sprocket, \$245. Trennel, 898-1224.
- '72 HONDA CB 450, new paint, fairing, trunk, new seat, needs battery, \$450. Luna, 293-4674 after 5.
- '78 DIPLOMAT, PS, PB, AT, Cruise Control, AC, power windows & doors, AM-FM stereo, \$3990. Bower, 298-8187.
- '81 DATSUN 280ZX, 2-door, coupe, 5-speed, GL package plus extras, 6500 miles, regal mist, \$12K. Surbey, 293-7869.
- '78 HONDA Twin Star, 185cc, 5000 miles. Jarrell, 293-9671.
- '75 BUICK Skylark 350V8, low mileage, one owner, PS, PB, AC, radio, complete maintenance records. Houghton, 299-3386.

- '82 BUICK Regal limited V6, AC, tilt wheel, cruise, AM-FM stereo cassette. Baney, 294-8970.
- '72 FIAT 850 Spyder convertible, serious calls only; '74 Gremlin 6-cylinder, AT, PB, PS, AM-FM, new tires, brakes, \$1750. Underhill, 294-5774 after 5:30.
- '71 CHEVY Impala, R&H, AC, AT, \$695. Chavez, 892-9765.
- '73 VW bug, 48K miles on new engine, \$2200. Muller, 299-1756.
- MOTOCROSS BIKE, racing type, all accessories; lots of motorcross bike parts; 10-speed bike; complete Ford truck repair manuals. Arana, 299-1214.
- '79 KAWASAKI KZ400, windshield, \$900. Scott, 294-8627, 256-3435.
- '77 DODGE Aspen SW, special edition, V8, PS, PB, AC, P seats, AM-FM, 20 mpg, \$2350. Cook, 869-6921.
- '80 CUTLASS Supreme, V-6, AC, AM-FM, PS, rear defogger, new tires, below NADA wholesale. Gallegos, 294-3790.
- '71 MERCURY Montego MX wagon, 9-passenger, easy lift hitch used once. McKenzie, 296-0620.
- '63 PONTIAC Lemans, AT on rear axle, V8-326 cu. in., 80K miles. Peters, 293-6356.
- '79 FORD sport van, fully customized, AT, PB, PS, AC, mags, dual tanks, 46K miles. Noack, 821-4494.
- '74 CHEV. Vega, 2-door, AT, PS, 42K miles, \$600. Spencer, 265-1909.
- '80 MAZDA RX7 GS, air, sunroof, 5-speed, AM-FM, 22K miles, first \$7500 takes it. Hopper, 344-1121.
- '74 L82 Corvette coupe; '76 Chev. custom van; '78 Plymouth Sapporo. French, 293-3451.
- '65 IMPALA convertible, 327 V8, \$3900. Constantineau, 298-6166.
- 20' BOAT & trailer, needs work, \$500. DiBona, 883-8937.
- '17' COLEMAN canoe, green, with 3 paddles & cartop pads, \$175 or trade for shotgun. Pickus, 255-0356.
- '82 SUBARU, 4 wheel drive station wagon, GL, \$6900. Schmitt, 821-8268.
- '75 GL 1000 Goldwing, 22K miles, all kinds of extras. Bewley, 255-8024.
- '63 VW bug, 70K miles, new brakes, blue, \$2200. Korbin, 821-8461.
- '82 CHEVY Cavalier, 4-door, light blue, 4-cylinder, AC, PS, PB, AT, 11,300 miles, \$6100. Patrick, 883-1413.
- '77 TOYOTA Celica, standard transmission, AC, AM-FM radio, low mileage, one owner. Marlman, 883-8660.
- '79 DODGE pickup, LWB, PS, AM-FM, one owner, low miles, \$4400; '74 Mercury Comet, AT, AC, \$1300. McFarland, 292-8136.
- '64 BUICK Wildcat, 2-door, maroon with white top, PS, PB, AT, AM-FM cassette. Lang, 884-5288.

- '76 TRANS AM 400, V8, AT, PS, PB, tilt, new paint. Gorman, 255-4431.

### REAL ESTATE

- 8-PLEX, near UNM/TV-I. Stromberg, 255-6131.
- LOS LUNAS, 1/2 acre, custom home area, utilities, low down, terms/trade for equity in home. Cook, 869-6921.
- 2-BEDROOM, 1 bath, approximately 760 sq. ft., \$28,644. Weber, 1305 Wheeler SE.
- 4-BEDROOM house, Winrock area, brick construction, hardwood floors, 2000 sq. ft., double garage, 2 fireplaces, \$94K. Jennings, 255-5950.

### WANTED

- ROOMMATE to share expenses on 3-bedroom house, NE, approximately \$200/month. Gabaldon, 292-7340.
- ALBUQUERQUE Municipal Band needs band instrumentalists. No audition. Every Monday 7-9 p.m. La Mesa Presbyterian Church on Copper near Louisiana. Libman, 292-5216.
- HOUSEMATE: mature, financially responsible, nonsmoker, share cozy 3-bedroom house with fireplace, large yards with gardening space, \$200/month includes utilities. Stornach, 255-8315 evenings.
- HANDGUN, 357 magnum Smith & Wesson. Garcia, 298-7340.
- ELECTRIC space heater, 1.5 kW or less & small exhaust fan with motor. Karnes, 884-8674.
- OLD SKIS with screw-on metal edges, to salvage metal edges. Pierson, 884-3174.
- CHILD'S crib, in good condition. Hertel, 255-0329.
- CAR TOP carrier, permanent type, compatible with Toyota Land Cruiser station wagon. Gerstle, 298-7854.
- HOUSEMATE to share expenses of townhouse, approximately 20 minutes from work. Potter, 831-0155.
- SET OF TICKETS for NCAA basketball championship tournament (final four games). Richards, 298-8554.
- GM service manuals for 1970 Buick Skylark. Donham, 299-0028.
- WIDE ANGLE and/or telephoto zoom lenses with mounts, suitable for the Canon AE1 program camera. Fugazzi, 884-4952.
- GIRL'S 20" bike; men's 25" bike. Sharp, 243-1498.

### FOUND

- LARGE 3-blade pocket knife, in street SE of Kirtland elementary school on 1/3. Leeman, 299-9149.

# Mexican Food Fiesta Tonight

TONIGHT at Happy Hour the versatile Andy's Gang plays for dancing starting at 7. The buffet is a Mexican food fiesta featuring Rio Grande favorites — red and green chili, enchiladas, tamales, tacos, sopapillas (in other words, the works). All this goes for \$5.75 for adults, \$3 for children under 12. It's served from 6 to 8 p.m.

\* \* \*

NEXT FRIDAY, Jan. 28, a local legend called Al Hurricane is on the bandstand blowing his particular kind of storm. A crowd is expected, so make your reservations early. Dining that evening is from an a la carte menu featuring your favorite steaks and seafood. A selection of goodies and munchies will also be available.

\* \* \*

SINGLE MINGLE '83 that was scheduled for the end of January is now rescheduled for Saturday, March 12. There was a misunderstanding in a private wedding party reservation for the ballroom. Anyway, mark March 12. It will be a biggie!

\* \* \*

SUPER BOWL SUNDAY will be observed at the Club with a couple of big screen television sets and the green chili pot on all afternoon. There'll be some interesting door prizes including a big one for \$50. The main lounge opens at 1 p.m. on Sunday, Jan. 30. The \$2 admission charge covers all the green chili and tortillas you can handle. Cheering, cheerleaders, and general football fan behavior is encouraged.

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VARIETY NIGHT on Saturday, Feb. 5, features a performance by the Bunraku Puppet Theatre of the "Dracula Magic Show." This show was performed last



YES, this is a staged photo. It's true that President Dacey accepted, on behalf of Plant Engineering Directorate 3600, the DOE Secretary's Award for Energy Efficiency. It's also true that Plant Engineering has done an outstanding job of reducing building energy consumption — by 6.6 percent, rather than the 5 percent mandated. And it's true that the reduction was in addition to an earlier 19 percent reduction in energy consumption. It's true too that part of the current reduction came from lowering thermostats (though most of the reduction was achieved with innovative systems that tailor heating and cooling requirements to outside temperatures). But it's *not* true that President Dacey has to wear a stocking cap in his office. Tom Clark, deputy manager of DOE/AL, presented the award.

Halloween at the KiMo Theatre and received favorable local reviews. The puppets are almost life size and are manipulated on stage by puppeteers in black body suits who are invisible in the stage lighting. Following the puppet show, the Walt Disney cartoon classic *Robin Hood* will be shown. A selection of sandwiches and goodies will be avail-

able at 5; the puppet show starts at 6:15 followed by the movie. Admission is 50 cents for children, \$1 adults.

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A PRE-TRIP MEETING for the Hawaii tour group is set for Thursday, Jan. 27, at 7:30 p.m. in the El Dorado room. The trip is scheduled for April 16-24 starting at \$580. Anyone interested in attending the meeting is invited. Various options, extra tours, and arrangements will be discussed.

The Disneyland/San Diego package March 26-April 2 or April 4-6 has space available. Price is \$328 per person. See Travel director Shirley McKenzie (2432) in the lobby tonight between 5 and 6 or check with the Club office.

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REDONDO ROUND DANCERS have a new series of lessons starting. The group meets Thursdays at 7 p.m. for instruction, ballroom round dancing at 8:30. New members are welcome.

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CORONADO GRANDSQUARES meet Mondays at 7 p.m. for square dance lessons; the group does its thing at 8:30. Call Ed Ehrman (2154), 4-2816, for more information.

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UPCOMING EVENTS — Sweetheart Ball on Feb. 12; Kiddie Carnival on Feb. 26.

## Congratulations

Freddie Weber (3150) and John Juhasz married Dec. 22 in Albuquerque.

Neil Horton (7248) and Dian Taylor married Jan. 1 in Aurora, Colo.

